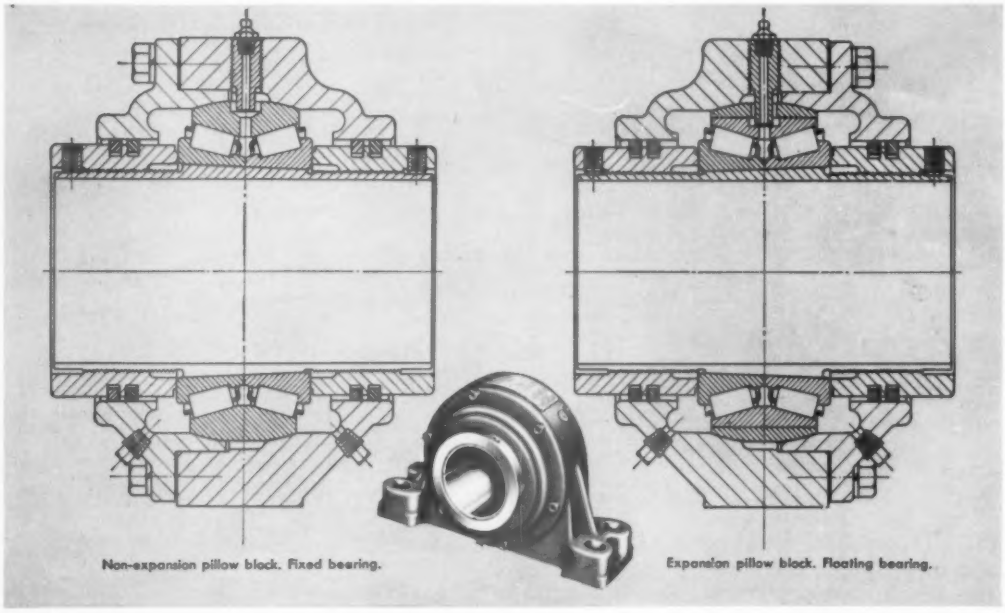
the OIL AND GAS JOURNAL

NEW TIMKEN® BEARING PILLOW BLOCK



Non-expansion pillow block. Fixed bearing.

Expansion pillow block. Floating bearing.

IT takes up less space. It weighs less. Yet the new Dodge-Timken® All-Steel pillow block has tremendous load-carrying capacity.

It's the result of the combined achievements of the Dodge Manufacturing Corporation, Mishawaka, Indiana, and The Timken Roller Bearing Company and makes use of an entirely new Timken bearing. Never before has a self-aligning, non-adjustable tapered roller bearing with tapered bore been used in pillow blocks.

Because of their tapered construction, Timken bearings take radial and thrust loads in any combination. Line contact between rollers and races gives Timken bearings load-carrying capacity to spare. Timken bearings are made of the finest steel ever developed for tapered roller bearings—Timken fine alloy steel.

When you install new Dodge-Timken pillow blocks, you can expect dependable performance because the bearings are the best. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ⓡ AND THRUST →ⓣ← LOADS OR ANY COMBINATION

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 OCTOBER 6, 1952

Your Pipe Line to Profits!

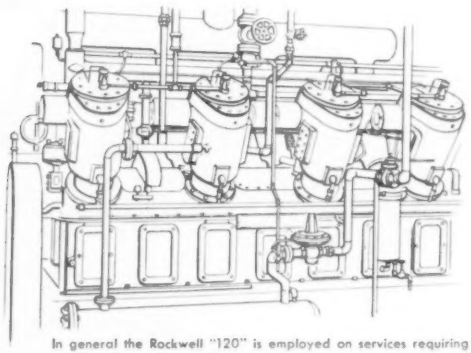
WITH THIS SPECIALIZED ROCKWELL EQUIPMENT FOR FIELD SERVICE

ROCKWELL FARM TAP REGULATOR

A simple, low cost way to serve gas to isolated consumers from nearby high pressure transmission lines. This regulator effects the primary cut in pressure from the line and brings gas to the consumer's premises at a safely lowered pressure that can be readily handled by a conventional service regulator.

The Rockwell Farm Tap Regulator is strongly constructed with heavy duty castings, a thick, pliable diaphragm and interchangeable valves and seats. Inlet pressure range 0 to 1000 psi, outlet pressures 5 to 400 psi. Write for bulletin.

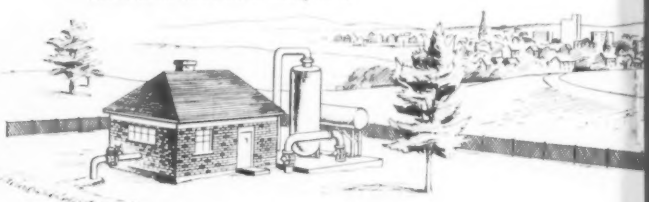
ROCKWELL "120" REGULATOR



In general the Rockwell "120" is employed on services requiring the highest degree of standard regulation accuracy for outlet pressures of 6 oz. or less where supply pressures do not exceed 5 lb.

This regulator is highly popular for gas engine service at compressor stations because it is both sensitive and strong—can be adjusted to maintain pressures of from below atmosphere to positive pressures of several ounces on the carburetor or mixing valve.

ROCKWELL HIGH PRESSURE DISPLACEMENT METER



1000 psi working pressure. Now Rockwell makes it possible to measure accurately the wide range delivery of gas from pipe line take off points with this, the first positive displacement meter ever available for working pressures above 500 psi. Made with sturdy, internally ribbed steel castings, relief valves for shock load protection, a leak resistant Teflon stuffing box and drains for removing condensate. Has a 46,000 cfh capacity of gas at 4 oz. base pressure when measured at 1000 psi. Available with standard index, Combined Record Gauge or the Emcorector.

You Can RELY ON ROCKWELL

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THE OIL AND GAS
JOURNAL
Vol. 51, No. 22

NEXT WEEK

The Journal's Annual Pipe-Line Number. More than 85 pages of valuable pipe-line articles earmarked for the man who is interested in transporting liquids and gases through pipes. Three special sections:

1. Pipe Lining Is Everybody's Business. If you are engaged in production, drilling, natural gasoline, refining, or petrochemicals, pipe lining is your business.
2. Remote and Automatic Control of Pipe-Line Stations. Eleven articles on one of the most significant developments in the pipe-line field.
3. Corrosion-Prevention and Maintenance Techniques.

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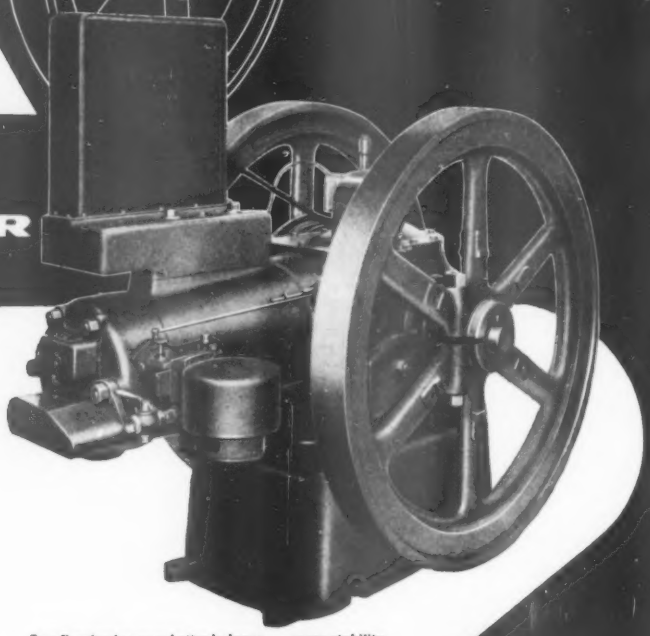
THIS BALANCE

...IS IN YOUR FAVOR



Two flywheels mean better balance . . . more stability on the mounting pedestal. No chance with a "ZC" for unbalanced flywheel effect to cause the engine to work loose from its mounting.

An outstanding performance advantage of the Fairbanks-Morse "ZC" is the *balanced* power output you get with the TWO big flywheels located between the engine and the pumping gear unit. And with TWO flywheels, you can drive from either side of the engine.

Load fluctuations are "smoothed out" by the properly proportioned flywheels, while the power of the engine remains constant. The flywheels store excess energy on the down stroke of the rods . . . then use this stored energy to equalize the load at the peak demand of the up stroke. You not only get smoother pumping . . . you protect engine and driven equipment against overload and abuse.

For the complete story on the "ZC," and the broad range of sizes, see your local supply store or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

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a name worth remembering

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For Lowered Gasoline Treating Costs

Select the Most Effective Du Pont Antioxidant

Gasolines vary in their response to different types of antioxidant. And different handling or storage methods may affect stability or response to antioxidant treatment. When natural inhibitors are present in the gasoline, induction period determinations are not always reliable indications of the tendency to form gum in storage. In some cases addition of small amounts of the proper antioxidant as the gasoline leaves the cracking unit may be desirable to prevent gum formation prior to Doctor sweetening or caustic washing. This often makes possible a considerable economy in the final treating.

To help you find the most economical solution to these gasoline stabilizing problems, Du Pont offers the following services:

1. Du Pont District Laboratories will help you evaluate your stock in terms of its antioxidant needs . . . and provide you with recommendations to fit your own refinery processing operation.

2. Du Pont helps you use these recommendations at the lowest possible cost by offering *two* Gasoline Antioxidants—No.'s 5 and 22. No. 5 is 50% N-normal-butyl-para-amino-phenol in 20% Anhydrous Methanol and 30% Anhydrous Isopropanol. No. 22 is N:N'-di-secondary butyl-para-phenylenediamine. Both are available from warehouses in Los Angeles, California; Houston, Texas; and Carney's Point, N. J.

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—George Washington (1732-1799)

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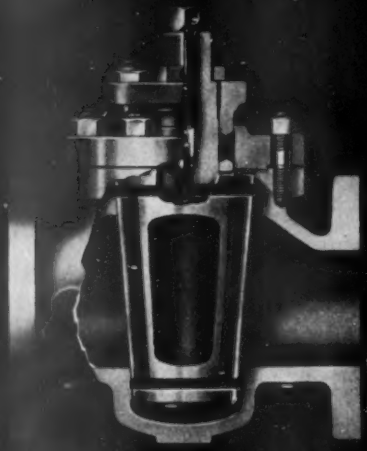


LUBRICATED PLUG

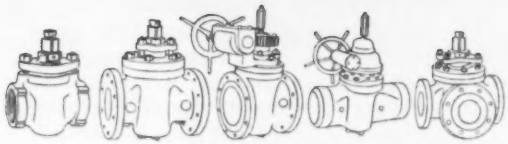
COMPLETE LINES OF LUBRICATED PLUG VALVES

Because of the wide range of services to which Lubricated Plug Valves can be adapted, they may be classed as "all-purpose" valves. Walworth manufactures complete lines of Lubricated Plug Valves in a variety of types and materials for working pressures up to 5,000 psi and for vacuum services. Sizes range from ½ to 30 inches. Write for descriptive literature.

Walworth also manufactures complete lines of gate, globe, angle, and check valves made of steel, bronze, iron, and special alloys.

Walworth valves, pipe fittings, and pipe wrenches total approximately 50,000 items and are sold through distributors all over the world.

Walworth engineers will be glad to help you with your problems. Call your local Walworth distributor, nearest Walworth sales office, or write to our General Offices, 60 East 42nd Street, New York 17, New York.



Illustrated in section is a Walworth No. 1700F Regular Gland Type, Wrench Operated, Steeliron, Lubricated Plug Valve. This particular line of valves has a working pressure rating of 200 psi at 150F or 125 psi at 450F. Sizes range from ½ to 8 inches. Other Walworth Lubricated Plug Valves include Single Gland and Ball Bearing types. They are available for a variety of working pressures.

For best results use Walworth Lubricants and Walworth High Pressure Lubricant Guns.

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Gas lift
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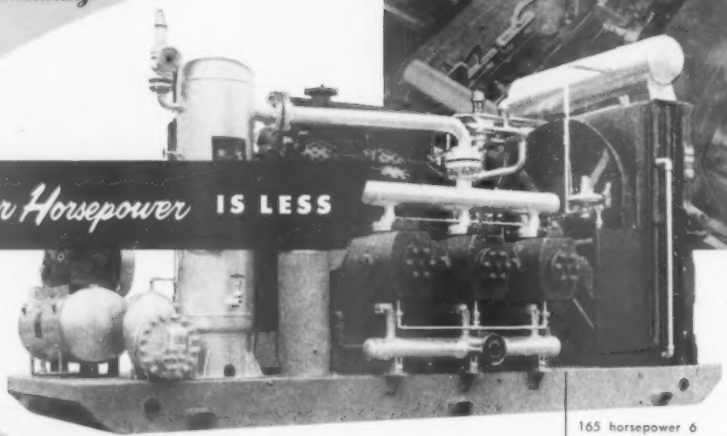

WHY *Cost Per Horsepower* IS LESS

on a Beaird-Ingersoll-Rand Packaged Compressor Plant

165 horsepower 6 JVG packaged compressor plant. Other sizes from 110 to 550 horsepower.

Complete packaging and complete assembly at the factory saves you the increased expense of field assembly — keeps *cost per horsepower, installed*, to a minimum.

EXPERIENCED ENGINEERING

Beaird engineers — the men who developed the completely packaged compressor plant — have behind them the experience of designing more than two hundred packaged compressors. Each plant is not only mechanically engineered but is individually gas engineered to meet specific operating requirements.

EFFICIENT PROCUREMENT OF COMPONENTS

Beaird's coordinated buying, warehousing, and transporting of the hundreds of separate parts which go into each compressor, relieves you of a formidable administrative load — prevents costly delays due to shortages. You can be confident of getting parts which meet specifications.

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All piping, manifolds and vessels are correctly sized and fitted — all components are properly aligned and levelled on the rugged steel base. Rigid testing and the Beaird reputation for quality manufacturing, assure you of smooth efficient operation when the plant is installed.

Write for the new booklet which gives you complete information on the Beaird-Ingersoll-Rand packaged compressor plant.

THE J. B. BEAIRD COMPANY, INC. **SHREVEPORT, LOUISIANA**

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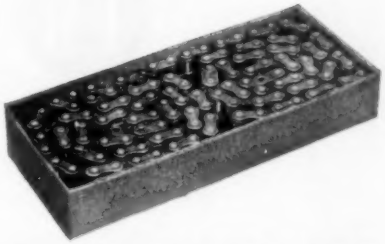
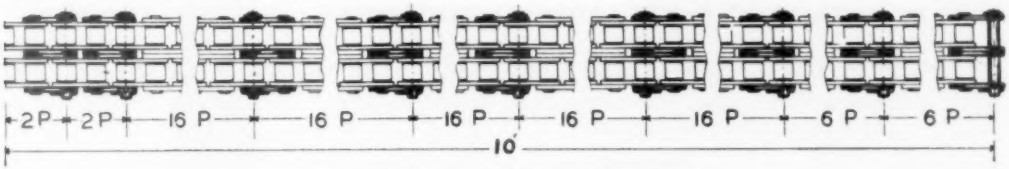
LOWEST COST PER HORSEPOWER, INSTALLED

Now it's Even Easier!

TO MAKE UP THE EXACT LENGTH OF CHAIN YOU NEED WITH IMPROVED BALDWIN ASSEMBLY RIVETED ROLLER CHAIN

The original Baldwin Assembly ("BA") Riveted Roller Chain completely eliminated old-fashioned, time-consuming, temper-trying, expensive chain cutting, while giving the user all the longer lived advantages of riveted chain. Now, with *Improved* Baldwin Assembly, chain assembly, disassembly and repairs are faster, easier, less expensive than ever before.





No. 100 Baldwin Assembly Riveted Roller Chain

You buy Baldwin Assembly in a packaged unit—a 10-foot strand in every box. Each strand contains a number of conveniently located coupler links at which points the chain can be quickly and easily taken apart. (The location of the coupler links varies slightly for each chain size.) By combining two or more of the sections in the basic 10-foot length, any length of chain required can be made up in the shortest possible time. What's more, there's no danger of damaging chain parts while doing it. If more than 10 feet of chain is needed, just buy an extra box.

Get all the facts on why the Improved Baldwin Assembly is better than ever. See your local supply store or write for Bulletin 52-3. Chain Belt Company, 4619 W. Greenfield Ave., Milwaukee 1, Wis.

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ROLLER CHAINS

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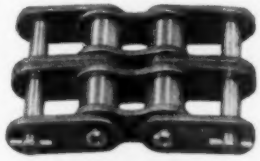
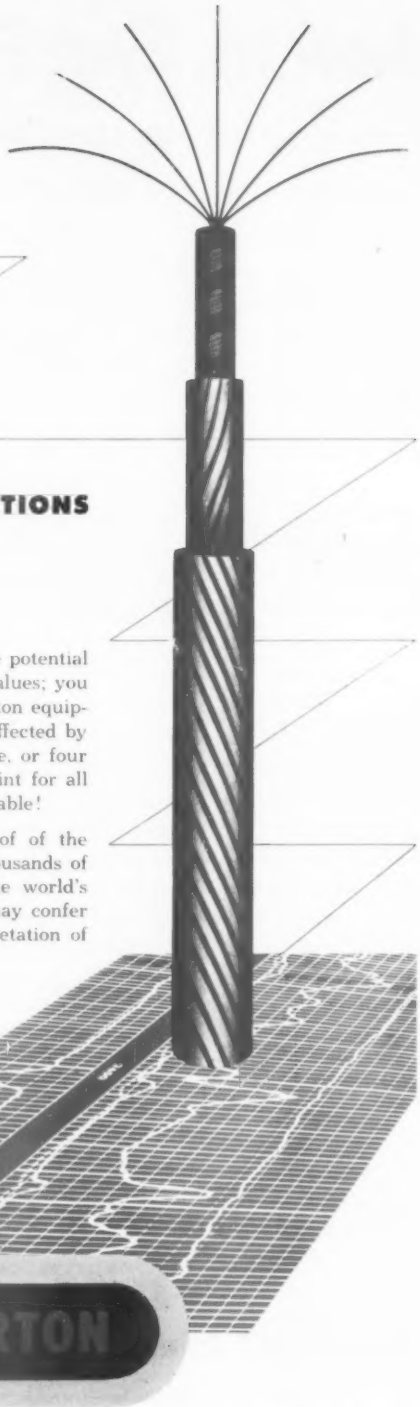
SPECIAL PURPOSE SECTIONS

A 3-Pitch Riveted Offset Section
This unit consists of an offset link and a coupler link riveted to a roller link. Use it for any drive requiring an odd number of pitches. We recommend this section instead of a single offset link because the riveted construction increases structural rigidity and durability.



A 3-Pitch Repair Section
This unit consists of two coupler links riveted to a roller link. When one or two links are accidentally damaged, it is often economical to repair the damage with a 3-pitch repair section rather than replace a longer section.

HALLIBURTON'S FM LOGGING



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Developed to record all electrical curves simultaneously *in one trip* – Halliburton's Frequency Modulation offers many new and exclusive advantages.

Saves Time and Money. You get all resistivity curves and the potential curves logged simultaneously with an absolute zero for base values; you secure the ultimate in accuracy from fully automatic Halliburton equipment, having built-in calibration features and with values unaffected by cable conditions; you have a choice of curves from two, three, or four electrode configurations; you obtain an identical reference point for all lateral curves... all in one trip and using a single conductor cable!

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STRENGTH *plus* LIGHTNESS

makes THOR your best buy in dock hose

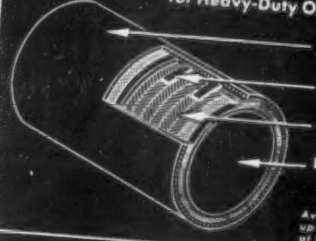
FOR heavy-duty dock service requiring a super-sturdy hose, ask the G.T.M.—Goodyear Technical Man—about THOR Oil Suction and Discharge Hose. It's outstanding in flexibility—takes sharp bends without trouble. And THOR combines strength with lightness-per-foot far better than any other hose you can buy.

Ask the G.T.M. for details today, or write Goodyear, Akron 16, Ohio.

GOODYEAR INDUSTRIAL RUBBER PRODUCTS

GTM-Specified THOR OIL SUCTION AND DISCHARGE HOSE

for Heavy-Duty Oil Dock Service



A—Oil-, abrasion-, sun- and weather-resisting cover protects hose.

B—Helix of flat steel or aluminum wire for reinforcement.

C—Multi-plies of heavy rayon cord for strength and flexibility.

D—Tube highly resistant to gasoline, oil; smooth bore for full flow.

Available in 4", 6", 8" and 10" dia. lengths up to 50' except for 10" aluminum wire hose at 25' maximum.

FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS *built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor. Look for him in the yellow pages of your Telephone Directory.*

GOODYEAR

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"Drop her just an inch, Mike"

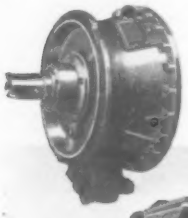
—faster, smoother way to set a beam

An outstanding advantage of Allison TORQMATIC DRIVE is that it gives the operator *positive control of the load at all times*—an important time and moneysaving feature in setting steel girders and beams. With TORQMATIC DRIVE, the operator can "inch" loads into place without clutching, declutching or friction braking. *He controls the load with the throttle!* This combination torque converter and fluid coupling gives all kinds of heavy-duty construction equipment greater smoothness and operating ease. It starts big loads easier and moves them faster. It cushions shock loads—reduces wear and tear on engines and equipment. It cuts operator fatigue—*gets more work done in less time at lower cost.*

Now successfully working in trucks, tractors, hoisting machinery and all kinds of earth-moving equipment, Allison TORQMATIC DRIVE is ideal with heavy-duty engines delivering 75 to 350 horsepower. For full details, write:

ALLISON *Division of* GENERAL MOTORS
Box 894J, Indianapolis 6, Indiana

GM GENERAL MOTORS



Allison TORQMATIC DRIVES

SCRAPERS TRACTORS TRUCKS SHOVELS LOCOMOTIVES DRILLING RIGS

when you specify light wall schedule 5 pipe

WHAT SCHEDULE 5 PIPE IS—
A light wall pipe, Carpenter Schedule 5 gives you more feet of pipe for every pound of scarce stainless steel. So you can quickly see how Schedule 5 reduces your cost per foot. Plus the fact that the larger I.D. means increased flow area.

HOW SCHEDULE 5 REDUCES COSTS
First saving is 40% to 50% on the cost of your pipe.

Since Schedule 5 is considerably lighter, this means quicker and easier installation.

And, because the increased capacity of Schedule 5 lets you use the next smaller pipe size, you can reduce substantially your costs of valves, fittings, etc.

FITTINGS ARE AVAILABLE
This pipe is easily adapted to use with existing lines of tubing or Schedule 40 and 10 pipe, using simple connectors. Fittings as well as stocks of Schedule 5 pipe are carried by conveniently located Carpenter distributors.

ADDITIONAL ADVANTAGES

Tubing sizes can now be replaced with light wall *pipe* . . . for ready hook-up with standard valves, pumps and other equipment which is normally manufactured in pipe sizes.

Data Sheets give you complete information about Carpenter Schedule 5 Stainless Pipe. Write for your personal copy. THE CARPENTER STEEL COMPANY, Alloy Tube Division, Union, N. J.
Export Dept.: The Carpenter Steel Co., Port Washington, N.Y. "CARSTEELCO"

Carpenter

THE U.S. NEEDS YOUR STEEL SCRAP NOW

STAINLESS TUBING & PIPE — Analysis · Tolerance · Finish

- guaranteed on every shipment

Wilson SETS A WELL SERVICING RECORD...

The photo below shows actual work in progress on what is believed to be the deepest well servicing job ever accomplished with a portable winch and mast. This well was in the Ventura Avenue Field and was done by the Harbor Production Company, Wilmington, California, *using a Wilson Mogul Torcair Winch* powered by GMC Twin Engine and Torque Converter and with a *Wilson Mogul Type Mast* of 260,000 rated capacity.

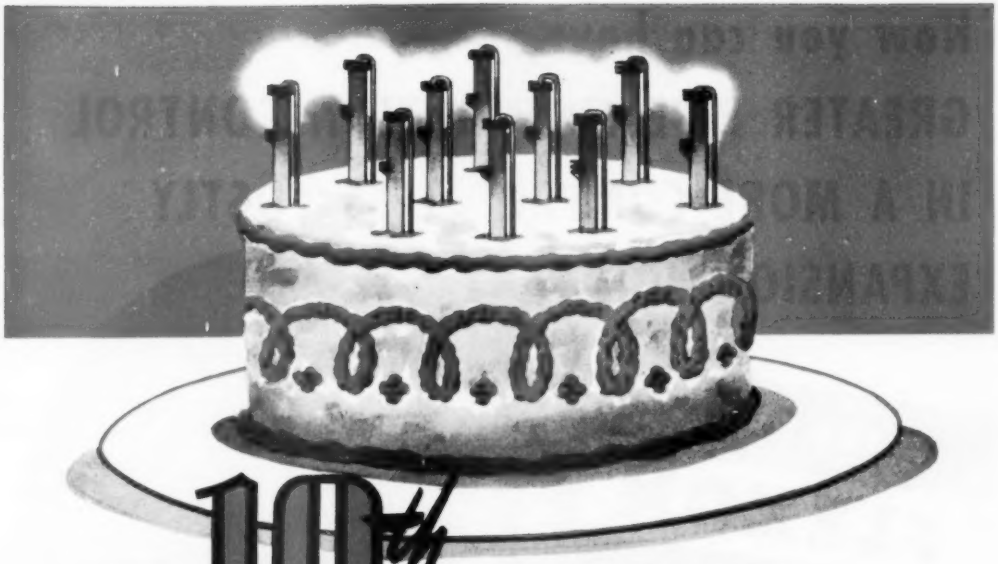
Facts on Well:

- ★ Total Depth 13,570 feet.
- ★ Perforations washed at 12,565 believed to be deepest.
- ★ 2-3/8" Bailer run to 13,013 feet on 9/16" line, believed to be deepest for this bailer on this size line.
- ★ Pulled and racked 202 stands 2-7/8" Upset Tubing and sucker rods totaling 12,200 feet.

ANOTHER REASON WHY IT PAYS TO BUY Wilson RIGS!

Wilson MANUFACTURING CO., Inc.

WICHITA FALLS, TEXAS



OUR 10th ANNIVERSARY OF BUILDING *BETTER* REFINERIES

Just 10 years ago, we received our first contract for remodeling the polymerization plant of the Ashland Oil & Refining Company of Ashland, Kentucky. This was followed by other contracts. This year, we have contracts for seven new cat crackers, as well as for other refinery construction. We are proud to state that we have had additional contracts from Ashland as well as nearly all refiners for whom we have done work.

We have just prepared a brochure with information about our company and the work we are doing. Write for a copy on your company stationery, and one will be mailed you promptly.

TRECo

REFINERY ENGINEERING *Company*

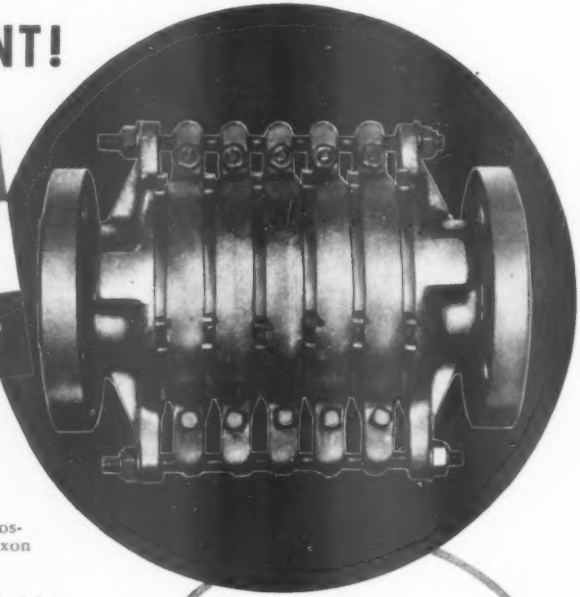
PHONE 5-5561 • TULSA, OKLAHOMA

Now you can have GREATER PIPE LINE MOTION CONTROL IN A MORE COMPACT, LESS COSTLY EXPANSION JOINT!

THE NEW

FLEXON

EXPANSION JOINT



Continuing research and development at Flexonics Corporation have now made it possible to offer design improvements in Flexon Expansion Joints that provide three basic advantages:

1. The face-to-face (over-all) dimension of a joint to handle a given amount of expansion has been reduced.
2. The reduction in size results in a lower expansion joint cost to handle a given amount of motion.
3. Exhaustive tests prove that these joints provide a maximum of motion commensurate with optimum life.

Coupled with such accepted advantages as compactness, ease of installation and freedom from maintenance, these additional advantages make Flexon Expansion Joints the most satisfactory method of controlling pipe line motion for the majority of installations.

Complete specifications are given in the new Flexon Expansion Joint Bulletin. Check this data before you select or specify expansion joints for your plant. Write for your copy, today.

THREE TYPES AVAILABLE

FREE FLEXING—Available in sizes from 3" through 48" I.D. in copper or stainless steel. Suitable for pressures to 30 psi, temperatures from minus 100° F. to 800° F.

CONTROLLED FLEXING—(Illustrated above) Available in sizes from 3" through 48" I.D. in copper or stainless steel. Suitable for pressures to 300 psi, temperatures from minus 100° F. to 800° F.

FLEXONIFLEX—Integral ring type. Available in sizes from ½" pipe through 6" pipe. Suitable for pressures to 5500 psi, temperatures from minus 400° F. to 1600° F.

Flexonics *Corporation*

EXPANSION JOINT DIVISION
1345 S. THIRD AVENUE · MAYWOOD, ILLINOIS

FORMERLY CHICAGO METAL HOSE CORPORATION

Flexon identifies products of Flexonics Corporation that have served industry for over 50 years.

Manufacturers of Convoluted and Corrugated Flexible Metal Hose in a Variety of Metals · Expansion Joints for Piping Systems · Stainless Steel and Brass Bellows · Flexible Metal Conduit and Armor · Assemblies of These Components

In Canada: Flexonics Corporation of Canada, Ltd., Brampton, Ontario

fill... and drain

the inside story of TANK PROTECTION

In one simple operation, the gas tank for a Schramm Air Compressor gets years of protection against fuel corrosion. Paint based on VINYLITE Brand Resins is poured in, shaken around to cover the entire surface, poured out. The residue inside air-dries in 24 hours.

The result is a coating that's extremely inert, durable, and impervious to gasoline attack . . . a smooth, continuous, unbroken lining for the tank's inner surface. Despite heat, vibration, and temperature change, the tough film sticks fast without cracking or peeling.

Wherever corrosion is a problem—in petroleum, chemical or processing industries—coatings formulated with VINYLITE Brand Resins offer the practical, effective solution. Easily applied by dip, brush or spray, coatings based on VINYLITE Resins are odorless, tasteless, non-flammable. Resisting weather, salt water, oils, greases, chemicals, corrosive atmospheres, and impact, they adhere strongly to metal, concrete, and masonry. Containers are protected from their contents, and contents are safe from container contamination. Readily cleaned, their color stays fresh. Maintenance costs are sharply reduced, equipment life is extended.

Machinery, structures, pipes and valves—all need the protection of coatings based on VINYLITE Brand Resins. Such coatings have the qualities that make VINYLITE Brand Resins and Plastics so useful to scores of products in defense and basic industry.

For information and a list of representative suppliers, write Dept. MP-68.

Data on "Corogard" coatings courtesy Minnesota Mining & Mfg. Co., 411 Piquette Ave., Detroit 2, Mich.

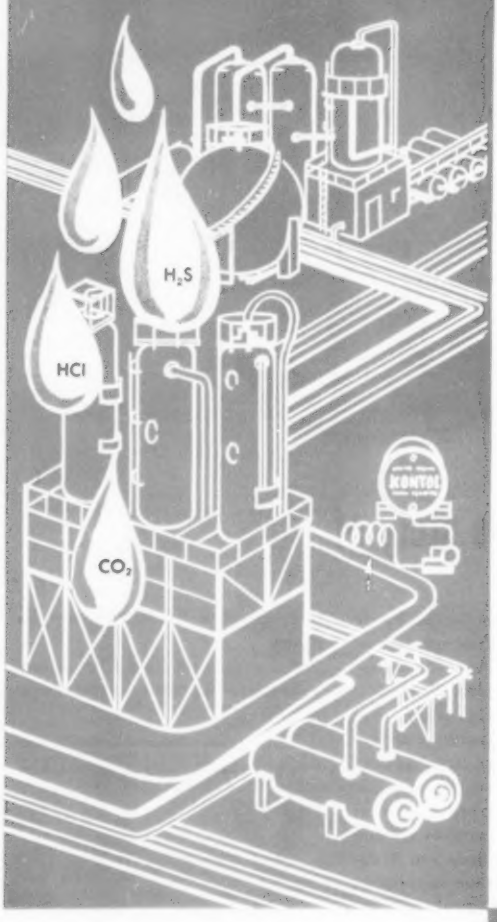
Vinylite RESINS

BAKELITE COMPANY

A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N. Y.

STOP

CORROSION LOSSES



KONTOL

Corrosion Inhibitor is used effectively in the refinery to combat corrosion caused by moisture, chlorides, HCl, CO_2, H_2S and organic acids. Kontol inhibits attack by H_2S, stopping blister formation at its source.

KONTOL can be used to control the corrosion of flow lines, fractionating towers, debutanizers, depropanizers, and stripping columns. It is also effective in the protection of heat exchangers, gathering systems, separators, scrubbers and overhead products lines.

KONTOL does not affect the quality of refined products, with reference to end point, gum-formation, anti-knock rating, color, ash content and so on.

KONTOL can be continuously injected into a refinery flow system by means of a chemical feed pump, or by once-a-day batch injection by means of a lubricating device.

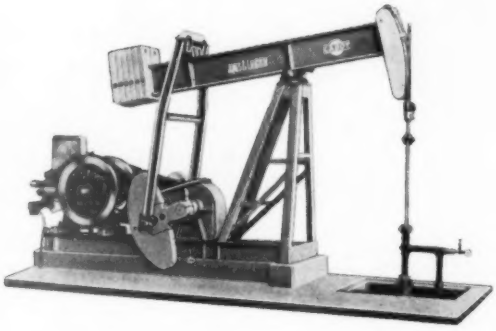
KONTOL provides protection against corrosion by adsorbing at metal surfaces as a thin, tough, impervious film which prevents contact by corrosive agents. It provides substantial protection against many kinds of refinery corrosion which, heretofore, have been accepted as being unavoidable.

For a prompt survey of your corrosion problems by a Tretolite Company refinery engineer, write or call the

CORROSION INHIBITING · DESALTING
DEHYDRATING · WATER DE-OILING
SCALE PREVENTING

TRETOLITE COMPANY
SAINT LOUIS 19, MISSOURI
LOS ANGELES 22, CALIFORNIA

practical production tools



Thousands of wells in the United States and Canada are equipped and maintained from near-by Jones & Laughlin Supply Stores. And the number is increasing.

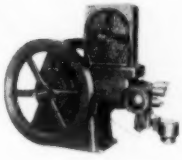
We offer production tools as practical as a knife and fork at mealtime. Everyone in the industry knows that a Cabot Unit powered with a Century motor or a Fairbanks-Morse "ZC" engine make a good team, and no equipment items are more universally respected than Axelson rods and bottom-hole pumps.

You will find our men as practical and helpful as the equipment they sell. Please reach for your telephone now. Yes, you'll find a night number if needed.

See interesting information in your Composite Catalog about Cabot Units, Fairbanks-Morse "ZC" Engines, and Axelson Pumping Equipment.

Rain, snow, sleet, ice . . . weather means nothing to the splash-proof Century.

Easy starting on the coldest days. Made specifically for oil well pumping.



We maintain complete Pump Repair Shops. Never junk an Axelson!

Jones & Laughlin Supply Company

EXPORT: 405 Lexington Ave., New York, N. Y., U. S. A.
88 STORES • 19 OFFICES • 9 RESIDENT SALESMEN
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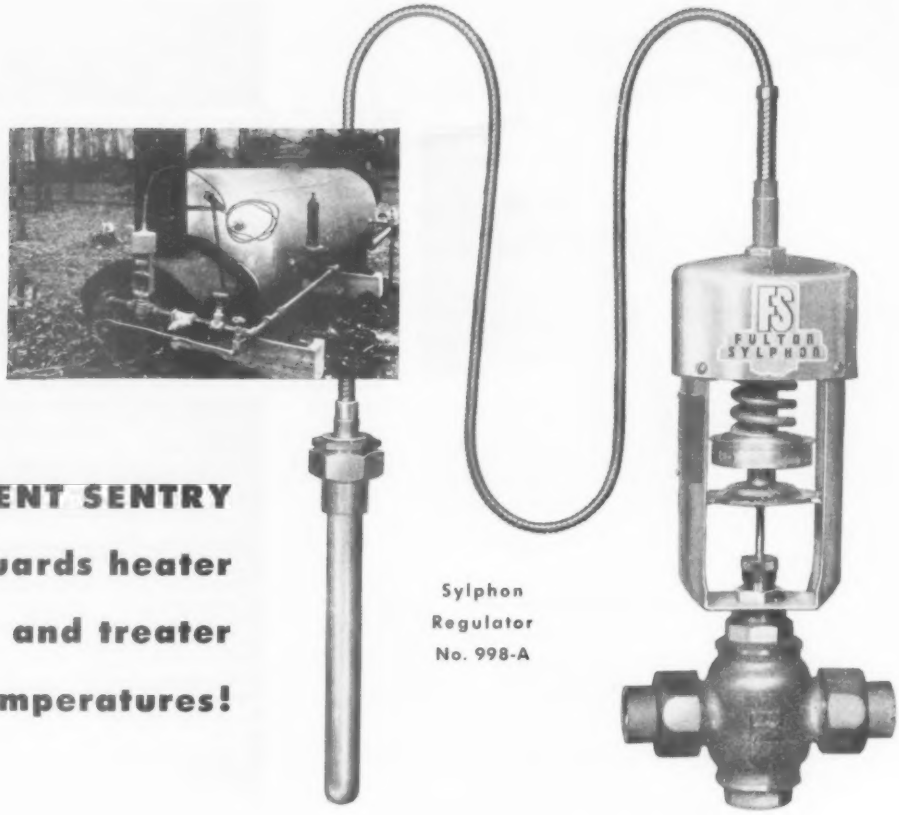
J&L STEEL
Subsidiary of Jones & Laughlin Steel Corporation



Sylphon
Regulator
No. 998-A

SILENT SENTRY guards heater and treater temperatures!

YOU'LL have no worries about constantly maintained temperature for oil heaters and treaters—when Sylphon Regulator 998-A is on the job. It assures proper temperature for separating water from the emulsion—day in and day out—automatically.

Sylphon Regulator 998-A has new features that give you extra advantages. Its press-formed frame of stainless steel provides added sturdiness . . . corrosive resistance . . . light weight and compactness. Its 2-ply Sylphon bellows provides added power.

And it has built-in, over-temperature protection; the thermostat assembly is safe-guarded against damage in the event the regulator bulb is subjected to above-limit temperatures.

Accurate, sturdy, compact, attractive—Sylphon Regulator 998-A operates practically maintenance-free for years. Get complete information, write for Catalog TO-A.

FIRST WITH BELLOWS

Temperature Controls • Bellows Devices • Bellows Assemblies

FULTON SYLPHON
DIVISION

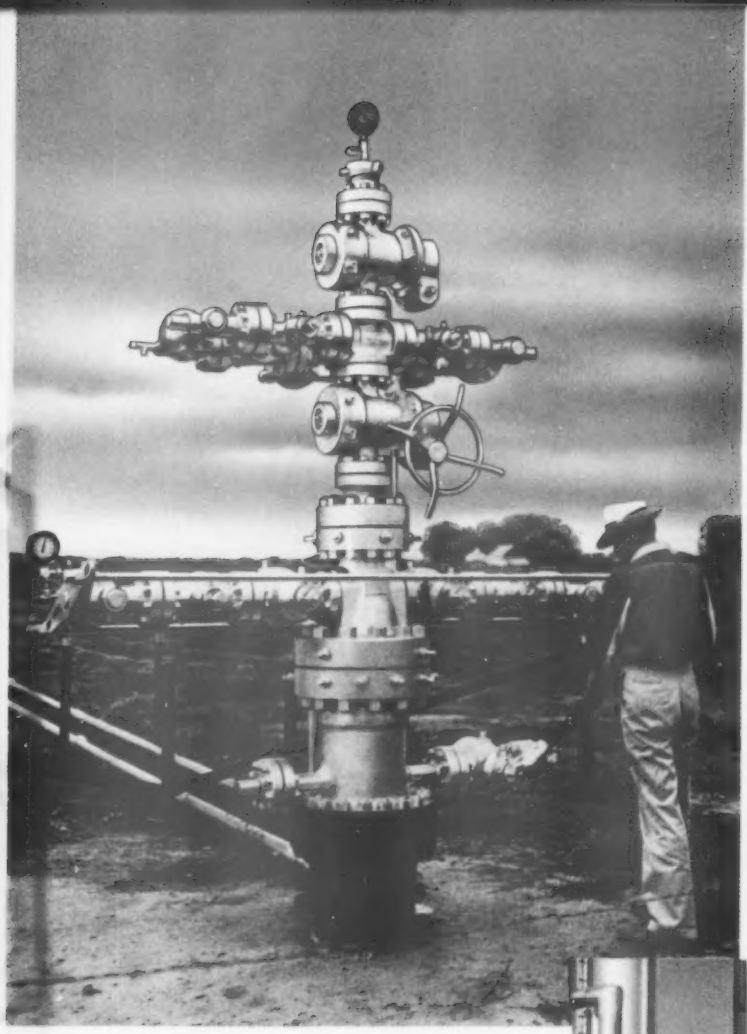
ROBERTSHAW-FULTON CONTROLS CO. KNOXVILLE 4, TENN.

Canadian Representatives, Darling Brothers, Montreal

Plant Protection, A MILLION TIMES OVER

More than five million Nordstrom valves have been installed in gas, petroleum, chemical and other industrial flow lines. Each one is a little additional insurance, an extra unit of plant protection.
The record is their best reference.

Rockwell Built
Another Rockwell Product **Nordstrom Valves**
LUBRICANT SEALED TO KEEP UPKEEP DOWN



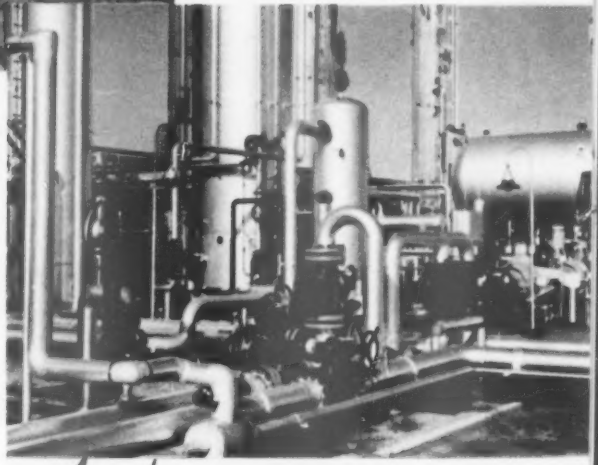
You'll Find Nordstrom Valves ANYWHERE . . . *Everywhere*

FIELD SERVICES

New design Christmas tree in Louisiana oil fields, built with Nordstrom 5,000 lb Hypreseal valves, is typical of Nordstrom field applications. This dual completion tree stands on well, producing from two depths.

PROCESS LINES

In a single process plant you'll likely find a dozen different types of Nordstrom valves. There is a proper Nordstrom valve for nearly any process service. Nordstrom valves in lines shown here are teamed with Rockwell-built Edward forged steel valves.



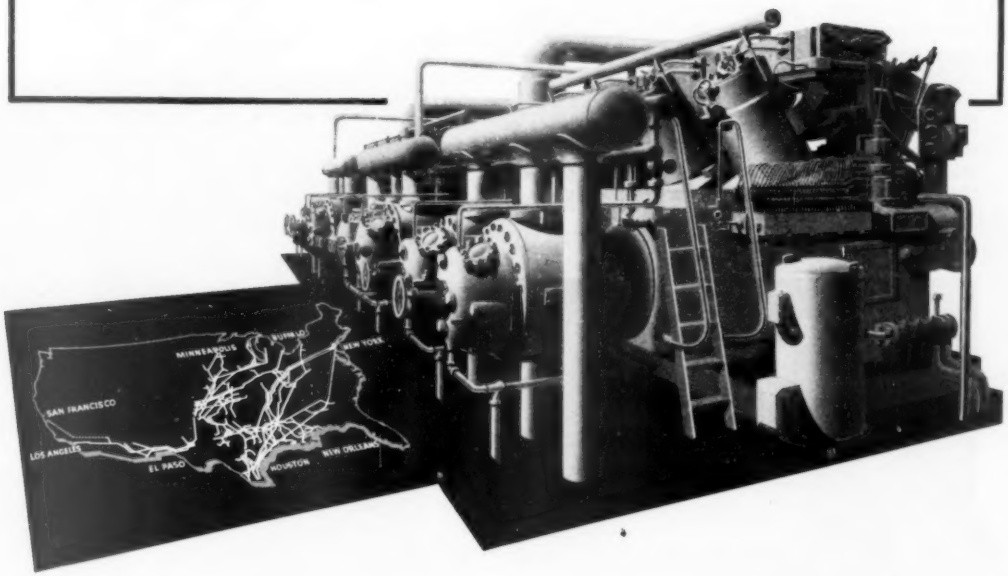
Rockwell Built
Another Rockwell Product **Nordstrom Valves**
LUBRICANT SEALED TO KEEP UPKEEP DOWN

Anywhere . . . . EVERYWHERE

In gas, petroleum, chemical and general industrial service . . . there's a Nordstrom Valve to do the job.
Rockwell Manufacturing Company,
400 N. Lexington Ave., Pittsburgh 8, Pa.

GULF SECURITY OIL

provides better lubrication
for pipe line compressor units,
helps prevent operating troubles



Here's the lubricant you can depend on to help keep your pumping stations operating smoothly and continuously—Gulf Security Oil. It provides effective protection for cylinders and bearings in both engines and compressors.

Because of its excellent resistance to oxidation, Gulf Security Oil stands up for many hundreds of hours without any appreciable change in its original properties. After years of operation with this quality lubricant, equipment shows remarkable freedom from cylinder wear and a minimum of carbon deposits on valves and rings. And because oil control rings are kept clean, oil consumption is remarkably low.

Operators of the many units lubricated with Gulf Security Oil report that this quality lubricant helps them get more operating hours between overhauls, and avoid unscheduled shutdowns.

For additional information on Gulf Security Oil and for the services of a Gulf Sales Engineer, get in touch with your nearest Gulf office today. Write, wire, or phone.

Gulf Oil Corporation · Gulf Refining Company,
Pittsburgh 30, Pennsylvania.

GULF INDUSTRIAL LUBRICATION

Performance records prove.....

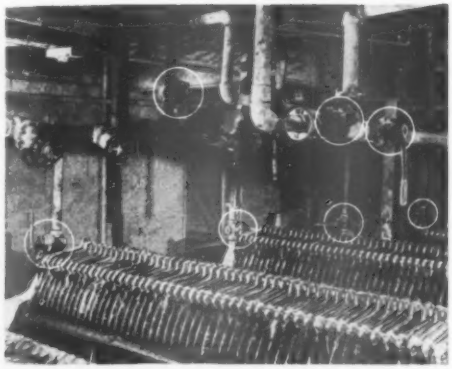
A pottery* in Ohio tried practically every type of valve on its "slip" lines, but the highly abrasive material, at 125 pounds pressure, ruined the average valve in a few months—in some cases, in a few weeks. Our engineers recommended HOMESTEAD Cam-Sealed VALVES with special, hard-faced plugs and bodies. The pottery installed them on all "slip" lines in the plant.

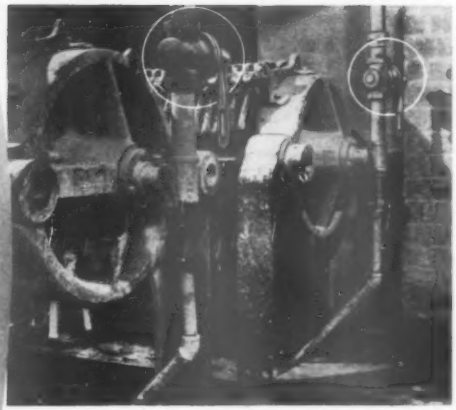
Performance records kept during the past several years show that the HOMESTEADS are lasting more than three times longer than any other valve previously used. Savings in replacement and maintenance costs repay many times over the first cost of the HOMESTEADS.

For more than 60 years HOMESTEAD VALVES have been licking equally tough jobs on scores of services in many different types of industries. Chances are there's a valve problem they can solve for you. Why not ask our engineers about it? No obligation.

*Name on request.

HOMESTEAD VALVES are a "Better Buy"

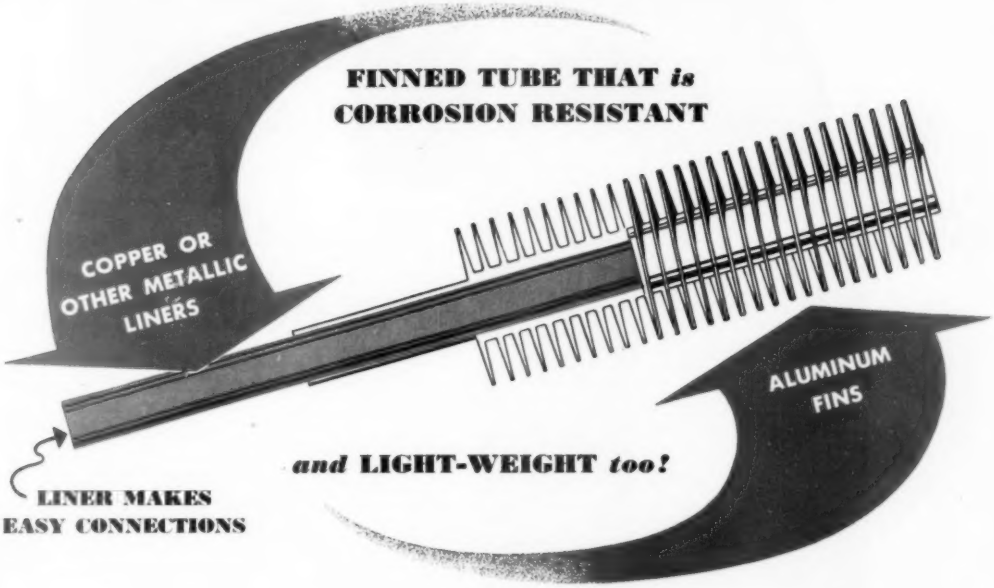




Write today for:
VALVE REFERENCE BOOK No. 39.

HOMESTEAD
VALVE MANUFACTURING CO.
"Serving Since 1892"
P. O. BOX 403 CORAOPOLIS, PA.

AVAILABLE NOW...



Wolverine Trufin* in *bi-metal* was developed to meet customer demand for a more effective heat transfer application than could previously be obtained with applied fin tubes. After years of research and experimentation, Wolverine product engineers came up with an ideal development: *An economical finned tube*—incorporating integral aluminum finned tube and liners of copper or copper base alloys.** The integral finned tube and liner are joined mechanically. This rugged construction is capable of withstanding extreme temperatures and vibration.

Actual applications have revealed that the heat transfer efficiency of Trufin is sometimes *nine times* that of plain tube! In many instances the use of Wolverine Trufin has resulted in low-cost installation and maintenance with maximum heat transfer efficiency.

Trufin in *bi-metal* is tough; it's durable and is as easy to fabricate as plain tube! Liners of Trufin *bi-metal* are extended to permit easy installation.

Wolverine Trufin in *bi-metal* is available in many sizes and fin spacings.

Send for your copy of Wolverine's illustrated Trufin brochure. **WOLVERINE TUBE DIVISION,** Calumet and Hecla Consolidated Copper Company, Inc., *Manufacturers of tubing exclusively.* **1459 Central Avenue, Detroit 9, Michigan.**

Wolverine also manufactures plain condenser tube in copper and copper base alloys.

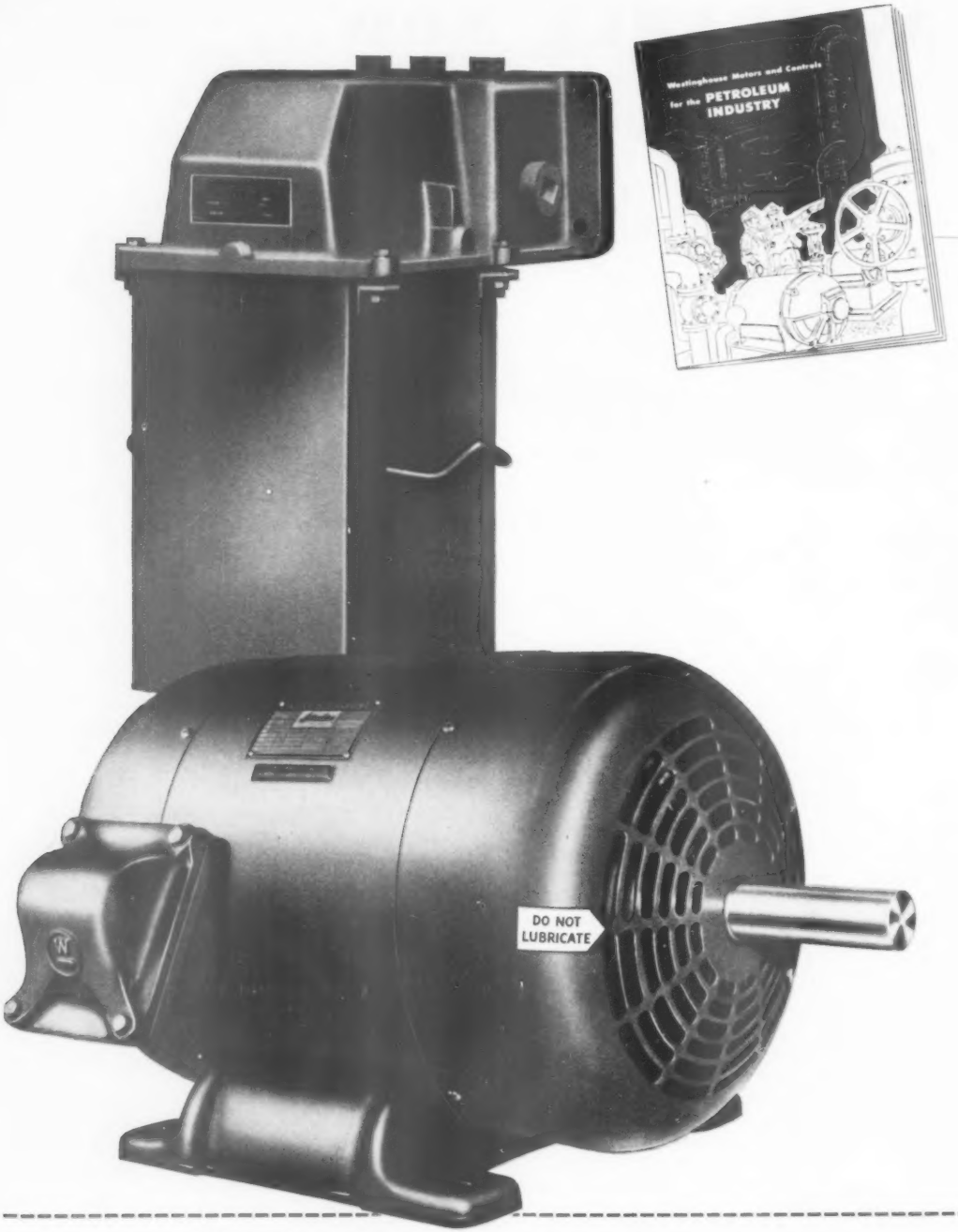
*REG. U.S. PAT. OFF.

Wolverine Trufin and the Wolverine Spun End Process available in Canada through the Unifin Tube Co., London, Ontario.

***Liners of steel and its alloys are also available.*

PLANTS IN DETROIT, MICHIGAN AND DECATUR, ALABAMA
Sales Offices in Principal Cities

Export Department, 13 E. 40th St., New York 16, N. Y.



WHAT *Life-Lines* REALLY DELIVER IS MORE SERVICE...LESS SERVICING

New petroleum booklet

answers important motor and control application problems

You'll see answers to typical problems like these:

the problem of hazardous locations . . . of corrosion . . .
of outdoor installations . . . of servicing . . . of dependability

In addition, are discussions on lubrication, maintenance, installation . . . on centralized motor control. In fact, it is the purpose of this booklet to analyze major motor and control application problems, and provide solutions.

Also included is information on Westinghouse motor and control equipment for petroleum processing. You'll see how Life-Line motors cut maintenance . . . how Bi-metal overload relays and AB circuit breakers cut down time. In case of fault, no need to remove cover to reset breaker or relay. Service is restored immediately.

Get the facts on the most complete and most advanced line of motors and controls available today. Ask your Westinghouse representative for your free copy of this new petroleum booklet, "Motors and Controls for Petroleum Processing," B-5444, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21699

YOU CAN BE SURE...IF IT'S
Westinghouse
Life-Line
MOTORS and CONTROLS

Four Cleveland Type CU units shown here are at work in a gasoline plant in West Texas. Thousands of this compact, heavy-duty vertical drive are in service in the oil fields and throughout American industry.

Hudson selects CLEVELANDS to drive heat exchanger fans

TO drive the fans at a new gasoline plant in West Texas, the Hudson Engineering Corporation selected Cleveland vertical worm gear speed reducers. On this turn-key job, eight CU units were installed to operate gas cooling towers and jacket water coolers to the compressor plant.

The Type CU worm gear drive is designed specifically for cooling tower service. It is a vertical speed reducer built to operate quietly and continuously, at high speeds, for long periods. Extreme conditions of heat and humidity do not affect it. It carries high thrust loads and high radial loads with maximum efficiency. It lends itself to rugged mounting and is easily installed, serviced and adjusted in the field. Every unit is run in and pretested under load before it leaves the factory.

For full description and engineering data, write for Bulletin 135. Free literature for the asking also on other drives in the complete Cleveland line. The Cleveland Worm & Gear Co., 3286 E. 80th St., Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

CLEVELAND
Worm Gear
Speed Reducers

RUST-BAN

REG. U. S. PAT. OFF.

Cuts CORROSION Costs

Economical Rust-Ban protective coatings are a practical defense against corrosion, a villain that costs the petroleum industry millions of dollars each year in rusted rig machinery, underground pipe lines, derricks, oil storage tanks and scores of other items.

Choose from a complete line of Rust-Ban protective coatings — all engineered to protect various types of expensive equipment from the ravages of rust.

Ask your Rust-Ban distributor to recommend the best Rust-Ban product for your particular corrosion problem. Upon request, Rust-Ban engineers will make a complete survey of your property at no cost to you, furnish a written report of the findings and prepare a protective coating recommendation for your guidance.

EASY TO APPLY

ECONOMICAL

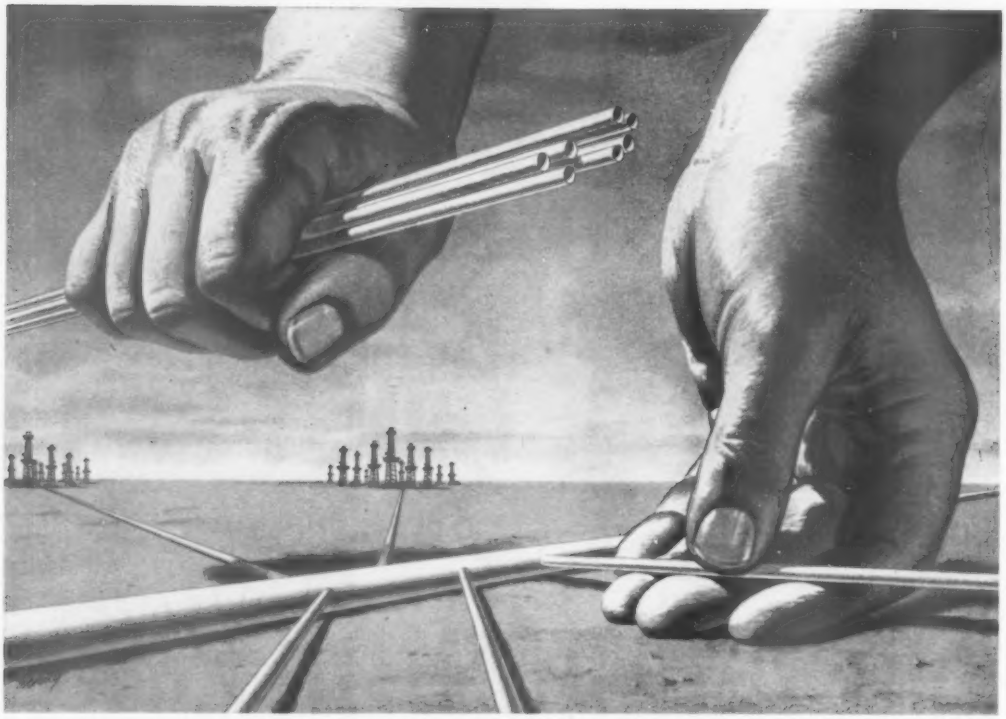
DURABLE

VERSATILE

RUST-BAN Marketers

REG. U. S. PAT. OFF.

HUMBLE OIL & REFINING CO., *Houston, Texas*
STANDARD OIL COMPANY, (KENTUCKY) *Louisville, Ky.*
PENOLA INC., *Detroit, Mich.*
THE CARTER OIL COMPANY, *Denver, Colo.*
ESSO STANDARD OIL COMPANY, *New York, N. Y.*



Helping to feed a giant appetite—on time!

To HELP satisfy the nation's giant, and growing, appetite for natural gas, hundreds of new gathering lines are rapidly being installed to feed the huge transmission lines.

To help keep these vital gathering line jobs on schedule, line pipe men increasingly rely on Kaiser Steel pipe. Thousands of miles of Kaiser Steel pipe are installed—all of it delivered *on time*.

You can be sure of such prompt, dependable delivery in the western two-thirds of the United States.

Add to this Kaiser Steel's *uniform quality* and *wide range of sizes* and it's clear why . . .

It's good business to do business with

Kaiser Steel

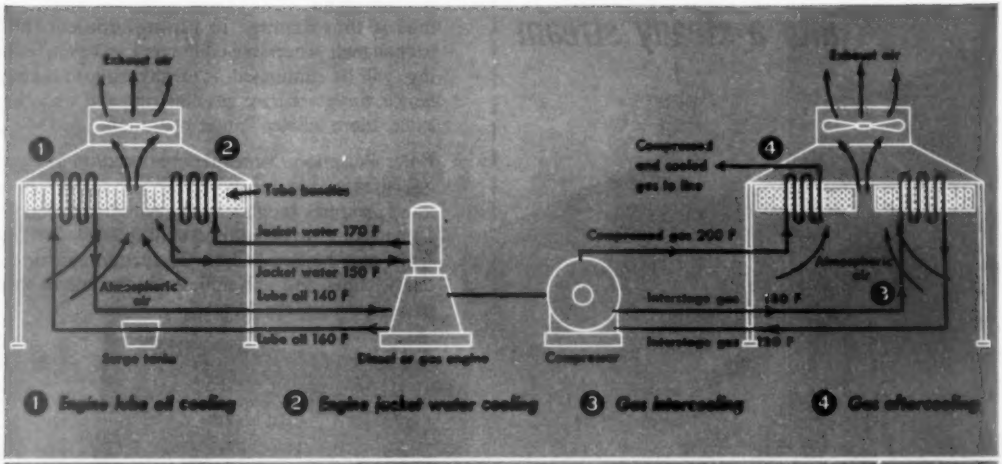
KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	8⅝" to 20" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅛" to 123¼" O.D.	Up to 55'	.188" to .375"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	22" to 30" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser

Prompt, dependable delivery at competitive prices • KAISER STEEL CORPORATION Los Angeles, Oakland, Seattle, Portland, Houston, Tulsa, New York

ALCO AIRCOOLERS

SOLVE ALL 4 COOLING PROBLEMS



in high-pressure gas compressor stations

In a typical high-pressure gas compressor station, two ALCO Aircoolers shown in the illustration perform four major cooling duties: (1) engine lube oil cooling (2)engine jacket water cooling (3) gas intercooling (4) gas aftercooling.

Versatile ALCO Aircoolers are particularly effective in this type installation because they are designed to give long, efficient performance. Such troubles as scale, costly water treatment and other cooling problems are eliminated.

The heart of the ALCO Aircooler is the ALCO fin tube, which provides an extended outside surface for maximum heat transfer efficiency, coupled with low air-flow resistance for economy in operation. A continuous helically wound copper fin is bonded to the tube with lead-tin alloy, and the external tube surface is coated with this alloy to improve atmospheric corrosion resistance. The entire unit is quickly and easily assembled in the field.

To put all these money saving features to work for you, call your nearest ALCO Sales Engineer at Beaumont, Chicago, Houston, Los Angeles, New York or Tulsa for more information or

Send Coupon for ALCO Aircooler Bulletin.

ALCO

ALCO PRODUCTS DIVISION
AMERICAN LOCOMOTIVE COMPANY
Plants: Dunkirk, New York • Beaumont, Texas

***In step with tomorrow*— ALCO AIRCOOLERS, Heat Exchangers, Evaporators, Feedwater Heaters, Pressure Vessels, Pipe**

ALCO PRODUCTS DIVISION
AMERICAN LOCOMOTIVE COMPANY
Schenectady, N. Y.

Gentlemen: Please send me the ALCO Aircooler Bulletin.

Name..... Position.....

Company.....

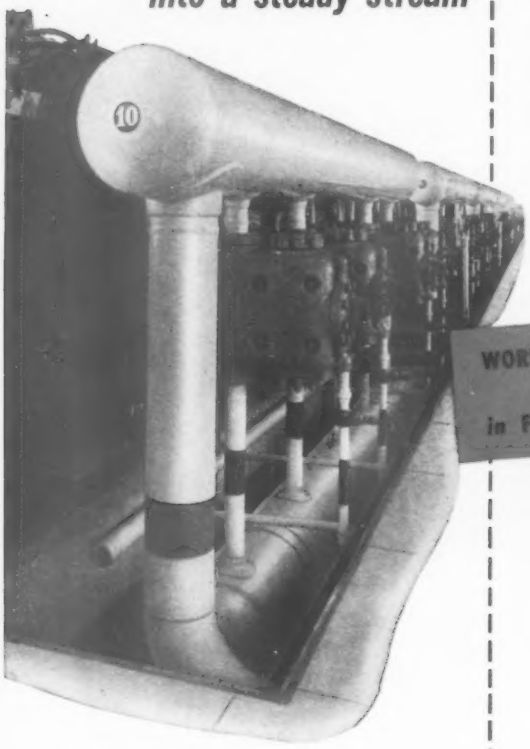
Address.....

City..... Zone..... State.....

FLUOR

Pulsation Dampeners

convert a pulsating flow into a steady stream



How do you reduce the throbbing in your plant piping—with oversized piping and heavier wall thicknesses? With reinforced structure supports and mechanical vibration dampeners? How accurately are you metering gas?

Fluor Pulsation Dampeners work at the cause of the trouble. Their unique design principle smooths out pulsations to the extent of at least 85%. This means that damage to piping, coolers, heat exchangers, processing equipment and even buildings will be eliminated. It means reduced maintenance, more accurate gas metering and smoother, safer, more efficient plant operation.

Fluor Pulsation Dampeners are used on any type gas stream—air, steam, hydrocarbons—at operating pressures ranging from vacuum to 5,000 psi. Dimensions can be tailored to fit space limitations. Units may be installed on the suction and/or discharge lines and are sufficiently flexible to meet minimum pressure drop requirements.

WORKMANSHIP and PERFORMANCE are guaranteed in FLUOR PULSATION DAMPENERS

Performance and workmanship are guaranteed in every instance where a Fundamental Pulsation Dampener or Pulsation Dampening System is installed. Here are excerpts from the guarantee:

"The Fluor Corporation, Ltd., guarantees that the pulsation dampeners or pulsation dampening systems . . . conform to all specific code requirements, and the workmanship is in accordance with standard shop practice by qualified welders."

". . . that the equipment will satisfactorily correct conditions of piping vibrations which are due to excessive pulse pressure in the piping system, or correct inaccurate gas metering caused by pulsative flow . . ."

". . . that the dampeners or pulsation dampening systems will decrease the magnitude of the pulse pressure in the compressor plant header piping to a value not to exceed 1.25 percent of the compressor operating pressure. The above percentage reduction applies to both suction and discharge pulsation dampeners or dampening systems . . ."

". . . that the pulse pressure in the plant header piping will not exceed the pulse pressure which is measured in the lateral between the volume bottle and the suction or discharge header, respectively."

". . . that the total pressure loss through the pulsation dampeners or pulsation dampening systems, measured by means of a differential pressure indicator and expressed in pounds per square inch, will not exceed the value set forth on the attached Dimensional Outline Sheet or layout drawing . . ."

Contact your nearest Fluor representative for the answer to your specific pulsative flow problems. Following preliminary study, he will be pleased to recommend the Fluor Pulsation Dampener that best fits your particular requirements. Or, write The Fluor Corporation, Ltd., Los Angeles 22, California.

Two Fluor "Package Type" Models

Fluor Pulsation Dampeners are available in two models: the Fundamental and the Higher Frequency. The Fundamental is recommended for installation in all compressor piping systems where excessive vibration is caused by peak pulse pressures at the fundamental frequency. The Higher Frequency Pulsation Dampener is recommended where frequencies are encountered above the fundamental (second harmonics or higher frequencies).

The Fluor Pulsation Dampening Piping System

Designed primarily for new construction, Fluor Pulsation Dampening Piping Systems are furnished in prefabricated form, ready for installation. Systems are designed for any type gaseous stream at operating pressures ranging from vacuum to 5,000 psi. Advantages include: improved flow measurement, fewer maintenance requirements, protection of related equipment, and smooth operation of plants and stations at rated capacity. Write for Bulletin PDS-8501.

FLUOR

Engineers - Constructors - Manufacturers

THE FLUOR CORPORATION, LTD. · LOS ANGELES · HOUSTON

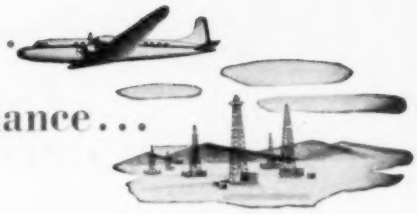
New York, Chicago, Pittsburgh, Boston, Tulsa, San Francisco, Birmingham and Calgary

Represented in the Sterling areas by:
Head Wrightson Processes Ltd., Teesdale House, Baltic Street, London, E.C.1, England

SINCE 1909

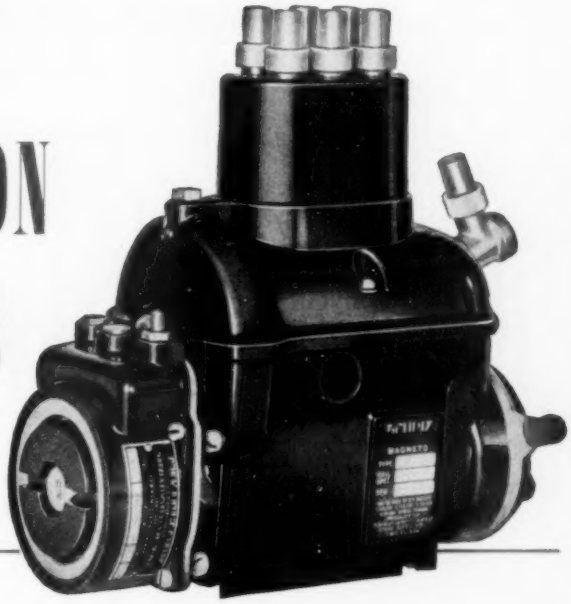
BE SURE WITH FLUOR

For Sky-High Quality...



and Down-to-Earth Performance...

BENDIX LOW-TENSION MAGNETOS



CONTROL EXPLOSIVE FUMES with FLAME-PROOF VENTILATION!

The Scintilla Magneto Division of the Bendix Aviation Corporation, foremost producer of low tension ignition systems for the aviation industry, now manufactures this same system to fully meet an important safety requirement of the petroleum industry's engine operations. For example, a special ventilating arrangement permits even air laden with explosive fumes to enter the magneto for ventilation without danger of igniting the surrounding air. Kits are also available to convert magnetos now in use to the "flame-proof" ventilation type.

With the Bendix Low-Tension Magneto, spark plug erosion is reduced to a minimum and variable or fixed ignition can be obtained by internal adjustment. The distribution of low tension voltage to the high tension coils is through a series of breaker assemblies, thus eliminating trouble often experienced with a conventional distributor.

For safety and low operating costs be sure to specify Bendix Low Tension for your magneto requirements. Complete data available on request.

- Low Plug Erosion Rate
- Breaker Type Distributor
- Ventilation without Fire Hazard
- Radio Shielding Available
- Variable or Fixed Ignition

Bendix

SCINTILLA MAGNETO DIVISION OF
SIDNEY, NEW YORK

Bendix AVIATION CORPORATION

Export Sales: Bendix International Division, 72 Fifth Avenue, New York 11, New York

FACTORY BRANCH OFFICES:
117 E. Providencia Avenue, Burbank, California • Stephenson Building, 6560 Cass Avenue, Detroit 2, Michigan
Brouwer Building, 176 W. Wisconsin Avenue, Milwaukee, Wisconsin • 582 Market Street, San Francisco 4, California

for

fast action

safe operation

long service life

IDEAL

AUTOMATIC GRIP SPIDERS and ELEVATORS

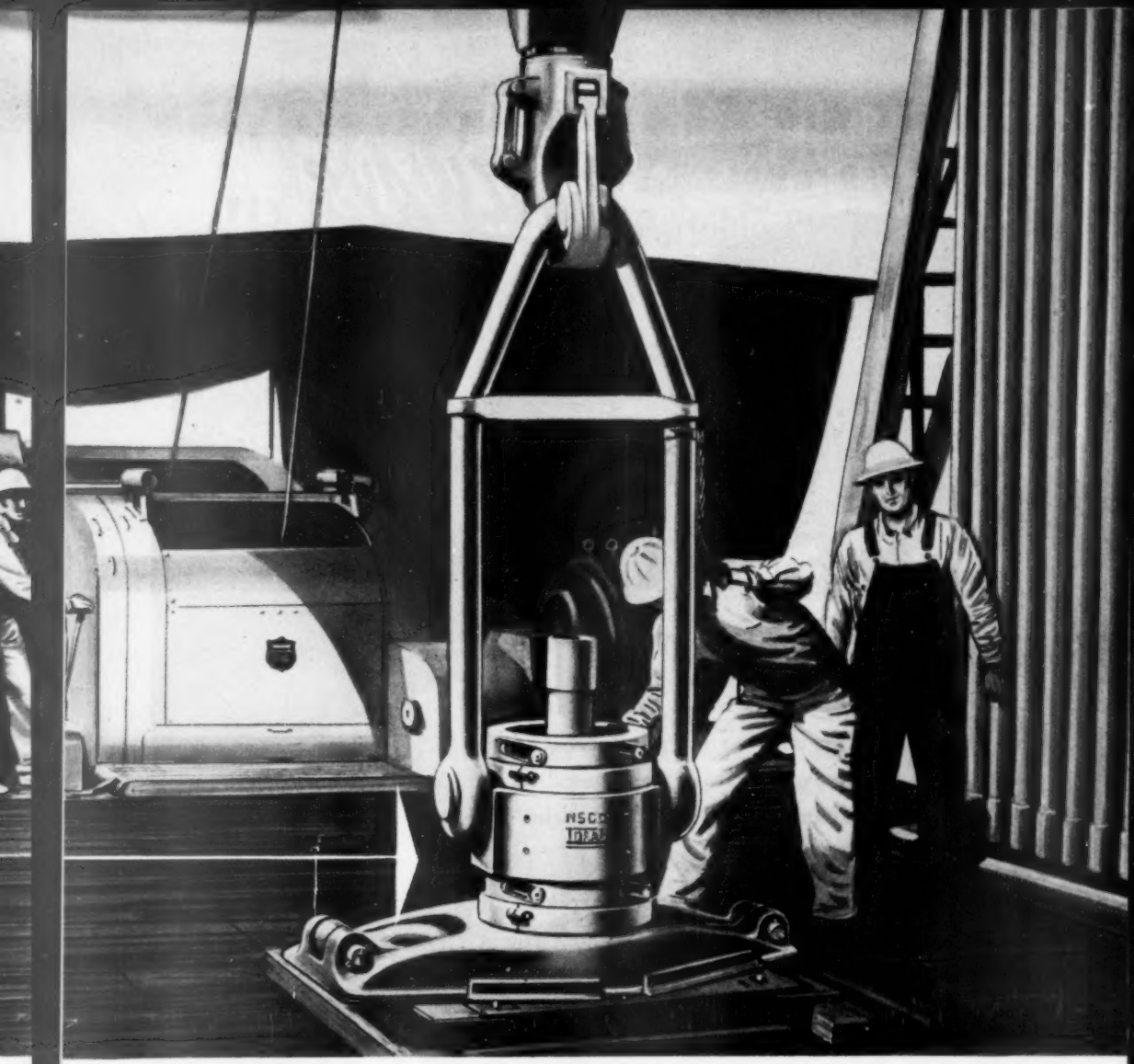
THE basic design and continuous improvement of National "Ideal" Drilling Equipment places primary emphasis on safety and operating speed as important factors in reducing the overall cost of drilling.

The development and time-proved serviceability of "Ideal" *Automatic Grip* Spiders and Elevators is a case in point. The complete line of "Ideal" equipment for handling casing and tubing includes a standard weight design with $10\frac{3}{4}$" and $13\frac{3}{8}$" bodies, and an extra-heavy capacity type with $9\frac{5}{8}$" body.

The fast action, safe operation and long service life of "Ideal" Spiders and Elevators result from inherent design and construction features. They are:

fast acting because the slips operate automatically in unison, rapidly setting or releasing their grip on the casing.

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT



safe in operation because the extra long slips provide greater gripping surface, and eliminate danger of dropped casing because gripping and releasing of slips is coordinated and interdependent between spider and elevator.

serviceable and dependable because they are built to work together with other "Ideal" Derrick Equipment under the most severe operating conditions.

Ask for complete details at the nearby National Supply Store where you'll find everything that's standard and everything that's new in oil drilling and production equipment.

NATIONAL BLUE PRODUCTS

THE NATIONAL SUPPLY COMPANY

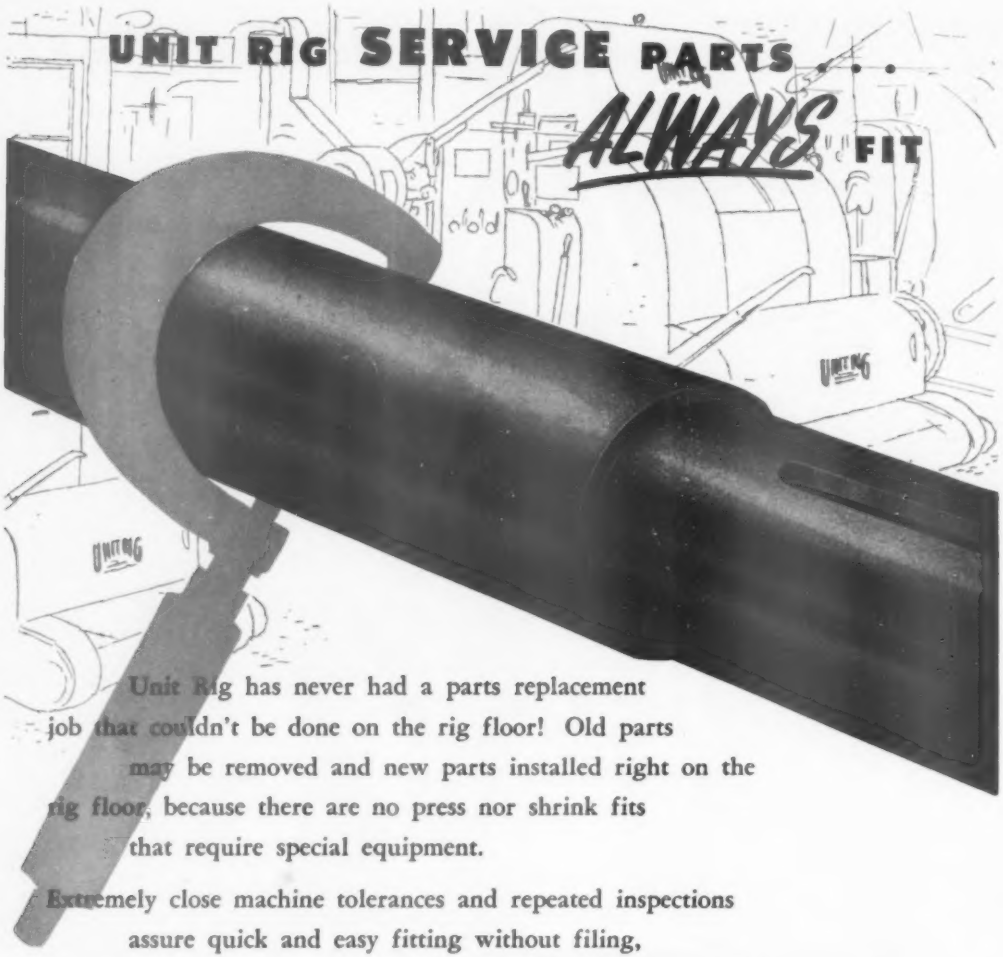
PITTSBURGH 30, PENNSYLVANIA

DIVISION OFFICES: Casper · Ft. Worth · Houston · Pittsburgh Tulsa · Torrance
CANADA: The National Supply Company, Ltd., 702 Barron Bldg., 610 Eighth Avenue, West, Calgary, Alberta
EXPORT: 600 Fifth Ave., New York 20, N.Y., U.S.A., River Plate House, 12 South Place, London, E.C.2

SPANG STEEL PIPE · SUPERIOR & ATLAS ENGINES

UNIT RIG SERVICE PARTS . . .

ALWAYS FIT



Unit Rig has never had a parts replacement job that couldn't be done on the rig floor! Old parts may be removed and new parts installed right on the rig floor, because there are no press nor shrink fits that require special equipment.

Extremely close machine tolerances and repeated inspections assure quick and easy fitting without filing, grinding, welding or re-machining.

Prompt delivery of *parts that fit* is one more reason why you save time and money when you own Unit Rig equipment. Make your next drawworks a Unit Rig.

UNIT RIG & EQUIPMENT CO.
TULSA, OKLAHOMA U.S.A.

DESIGNED FOR THE JOB....

UR-512

UNIT RIG DRAWWORKS ARE SOLD EXCLUSIVELY THROUGH THESE AUTHORIZED DISTRIBUTORS IN U.S.A. AND CANADA

BOVAIRD SUPPLY COMPANY
HOUSTON OIL FIELD MATERIAL COMPANY
HOWARD SUPPY COMPANY
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JONES & LAUGHLIN SUPPLY COMPANY
LUCEY PRODUCTS CORPORATION
MID-CONTINENT SUPPLY COMPANY
NORVELL-WILDER SUPPLY COMPANY
OIL WELL SUPPLY COMPANY

EXPORT SALES—MID-CONTINENT SUPPLY COMPANY, 42 Broadway, New York City. **Cable**—MIDUNITRIG

SPEED — SAFETY — ECONOMY

with CHIKSAN's new

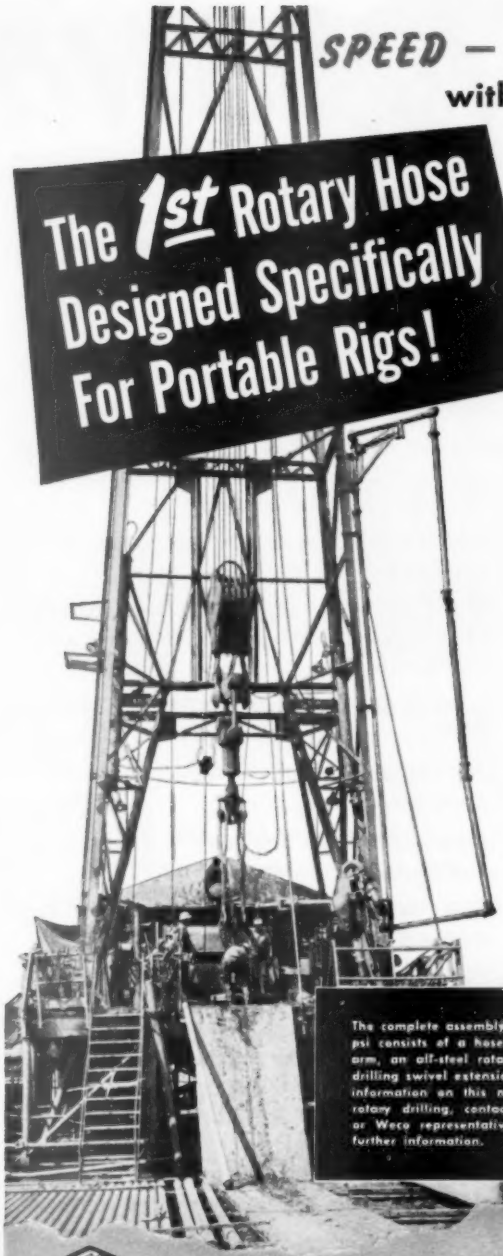
Portable Rig Rotary Hose

The 1st Rotary Hose Designed Specifically For Portable Rigs!

Oil Men Asked for it..
Chiksan Engineered it!

CHECK THESE FEATURES

- Designed and engineered specifically for Portable Rigs
- Provides complete flexibility and ease of operation in limited space
- Provides uniform strength and safety
- Eliminates possibility of loss of circulation or complete failure
- Accommodates higher pump pressures
- Engineered for practical maintenance
- Strengthens both drilling swivel and standpipe goosenecks
- Eliminates rubbing of hose against mast leg
- Eliminates kinking or twisting of hose
- Keeps derrick floor clear of hose
- Can withstand extreme climatic conditions
- Easily, swiftly, and safely transported
- Savings in initial cost and cost per foot of hole drilled
- Successfully field tested



The complete assembly tested to 6000 psi consists of a hose-saver outrigger arm, an all-steel rotary hose, and a drilling swivel extension. For complete information on this new advance in rotary drilling, contact your Chiksan or Weco representative, or write for further information.

Write Chiksan today for special brochure with detailed engineering drawings.

Dept. No. 10-OGJ

CHIKSAN TRADE MARK REG.

The Flow of Enterprise Relies on CHIKSAN

Ball-Bearing Swivel Joints

Representatives in Principal Cities
Sold by Leading Supply Stores Everywhere

CHIKSAN COMPANY • BREA, CALIFORNIA • Chicago 28, Illinois • Newark 2, New Jersey
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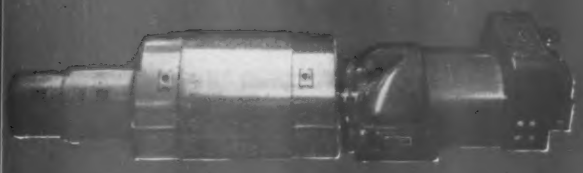
ELLIOTT
equipment for power and process

Deaerating Heaters

Condensers

Generators for Diesels



Turbine Generators

Large Motors

Centrifugal Blowers

Tops in

HERE'S WHY

this Elliott turbine is the natural choice among men who demand sound performance with low maintenance:

AIRWALL LABYRINTH SEALS WITH NO RUBBING CONTACT protect bearings against dust, fly ash, etc. —

CENTERLINE SUPPORT assures constant alignment at all times, irrespective of possible expansion due to temperature changes —

PACKING GLANDS REMOVABLE without raising upper half of turbine casing —

SHAFT IS SPRAY-COATED WITH STAINLESS STEEL under the packing gland, eliminating special maintenance after shutdown —

TURBINE BUCKETS AND SHROUD OF STAINLESS STEEL for maximum life and sustained efficiency —

ROTORS DYNAMICALLY BALANCED for smooth operation —

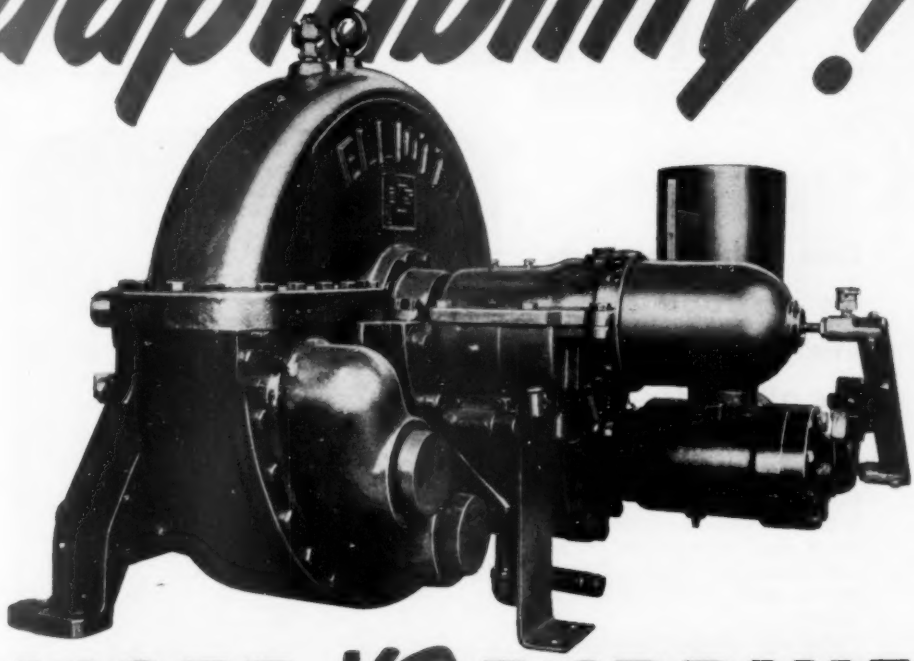
CONSTANT-SPEED GOVERNOR READILY ADJUSTED for permanent speed change —

BUILT-IN STEAM STRAINER of heavy stainless steel and

STANDARDIZED PARTS that fit all YR Turbines, greatly reducing parts inventory.

Bulletin H-16 has the full story. Phone or write your nearest Elliott office.

adaptability!



ELLIOTT YR TURBINE

HERE'S WHY ***this popular turbine can be adapted to practically any operating conditions:***

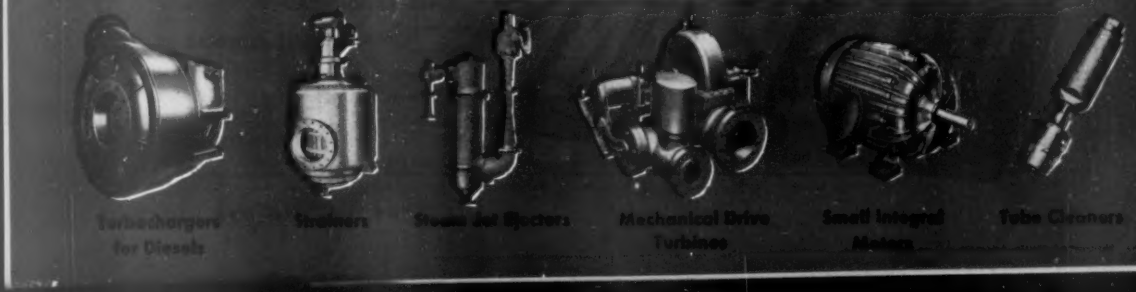
- **Six elective control devices, including:**
  1. *Two handvalves controlling nozzling*
  2. *Hand-operated speed changer*
  3. *Remote control speed changer, air or electric*
  4. *High exhaust-pressure trip*
  5. *Remote control electrical trip*
  6. *Hand throttled emergency trip valve.*
- **Five frame sizes**
- **Eight different turbine types**
- **Your choice of several governors each independent of the standard overspeed governor**
- **Gland seal piping for condensing operation, or operation with gas**
- **Exhaust connection on either side**

ELLIOTT Company Q2-5

Steam Turbine Dept. • **JEANNETTE, PA.**

Plants at: JEANNETTE, PA. • RIDGWAY, PA. • AMPERE, N. J. • SPRINGFIELD, O. • NEWARK, N. J.

DISTRICT OFFICES IN PRINCIPAL CITIES



Turbochargers for Diesels · Stokers · Steam Jet Ejectors · Mechanical Drive Turbines · Small Integral Motors · Tube Cleaners

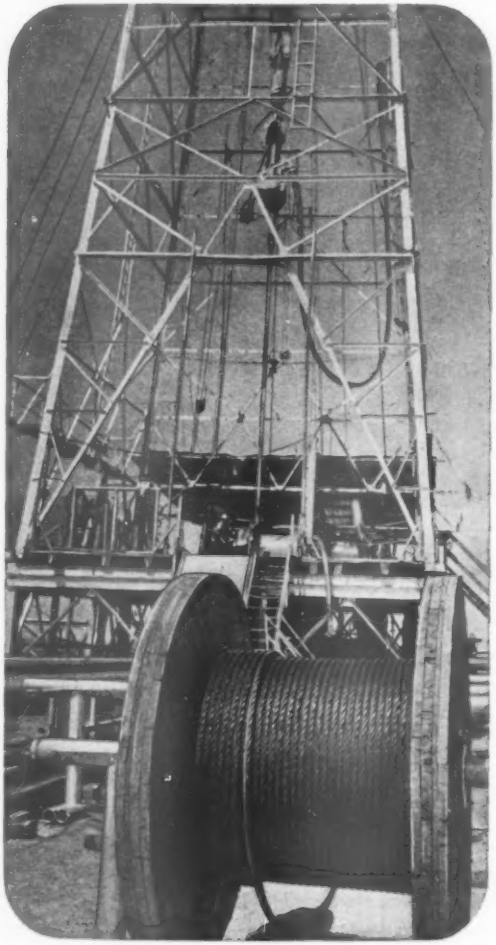
WIRE ROPE

This is the longest-lasting rope we've ever made for the oil fields

JUST MENTION wire rope and most everyone thinks of Roebling. For one thing, Roebling made the first wire rope in America. But what counts more, we've always set the pace in developing better wire rope for the needs of every branch of industry.

Roebling Preformed "Blue Center" Steel Wire Rope is today's best bet for the oil fields. It's safe, dependable and stands up under rough going. It saves you time and cuts costs.

There's a Roebling rope that will prove the longest-lasting and most economical in your operations. Call on your Roebling Field Man for his recommendations . . . District Offices at Cleveland, Denver, Houston, Los Angeles, Odessa and Tulsa. John A. Roebling's Sons Company, Trenton 2, New Jersey.



ROEBLING

DISTRIBUTED BY

THE NATIONAL SUPPLY COMPANY

REPUBLIC SUPPLY COMPANY

FACT

ABOUT TUBE PRICES

Alcoa Aluminum Heat Exchanger Tubes continue to have a significant price advantage over other metals. As this chart shows, Alcoa Aluminum Tubes cost ½ less than Admiralty, ⅓ less than Mild Steel, ⅕ as much as Stainless.

PRICE PER 16 FOOT LONG TUBE	5/8" O. D. x .049" wall	3/4" O. D. x .049" wall	3/4" O. D. x .065" wall	1" O. D. x .065" wall
3S-H14	$1.12	$1.23	$1.55	$1.99
Alclad 3S-H14	1.42	1.64	1.95	2.55
Seamless Mild Steel	2.44	2.56	2.90	3.18
Admiralty Brass	2.96	3.39	4.46	5.85
Cupro Nickel (30%)	4.26	5.11	6.50	8.88
Stainless Steel (304)	9.09	10.02	11.41	13.72

NOTE: Prices for 3S-H14 and Alclad 3S-H14 based on lots of 2000—4999 lbs.; for Admiralty and Cupro Nickel 5000 to 9999 lbs. Prices for Mild Steel and Stainless based on lots of 10000 ft. with exception of size 1" O. D. x .065" wall which is based on 5000 ft.

ALCOA

knows most about their use and application

Alcoa pioneered the use of aluminum in heat exchanger tubes 43 years ago. For complete information on application and installation, write for a copy of the booklet, *Alcoa Aluminum Heat Exchanger Tubes.* Write:

ALUMINUM COMPANY OF AMERICA · 1864-K Gulf Building · Pittsburgh 19, Pa.

OVER 6-MILLION FEET OF ALCOA TUBES ARE IN USE FOR APPLICATIONS LIKE THESE . . .

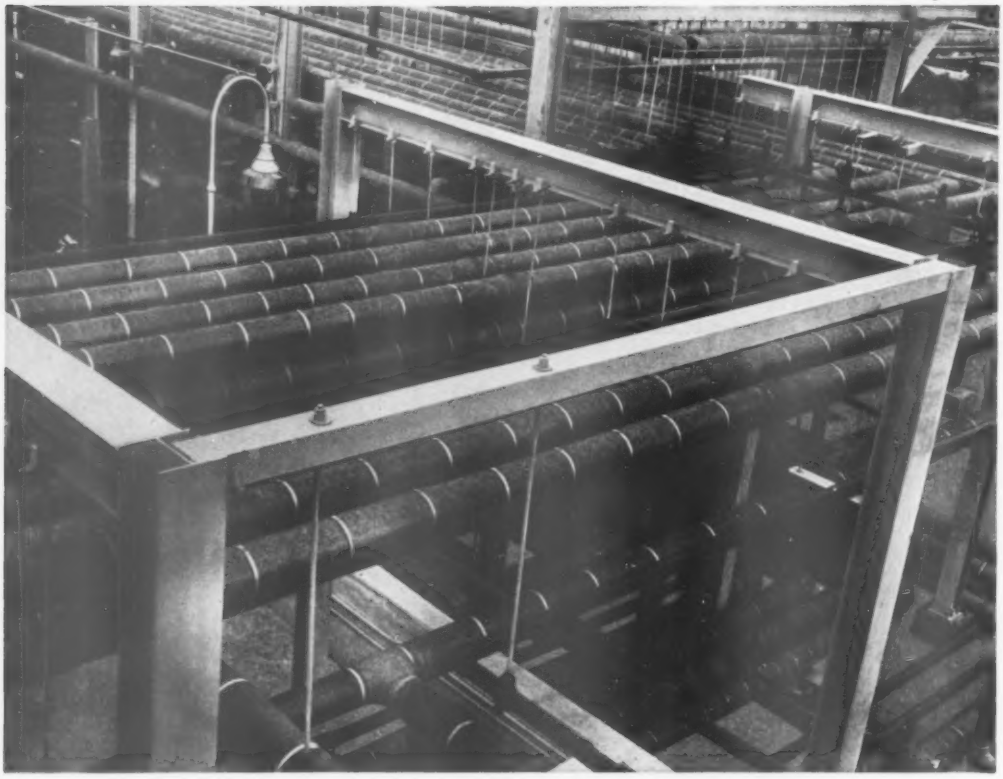
PETROLEUM

- Condensers handling hydrocarbon fractions from such processes as Thermal and Catalytic cracking, reforming, polymerizing, etc.
- Vapor recovery condensers
- Lube oil coolers
- Natural gas compressor after-coolers
- Recompressor after-coolers
- Hydrogen sulfide gas coolers
- Furfural condensers and heat exchangers
- Propane chilling
- Wax sweaters
- Lean oil—rich oil exchangers
- Amine solution coolers
- Glycol-amine heat exchangers and reboilers

CHEMICAL

- Butanol
- Ethanol
- Ethylene Glycol
- Glycerin
- Hydroabietyl
- Isopropanol
- Methanol
- Phenol
- Propylene Glycol
- Acetaldehyde
- Formaldehyde
- Furfural
- Heptaldehyde
- Acetic acid
- Stearic, Palmitic, Maleic, Oleic acids
- Butyric acid
- Naphtha
- Ricinoleic acid
- Acetanilide
- Ammonia
- Hydrogen Cyanide
- Nitric acid (concentrated)
- Pyridine
- Hydrogen Sulfide
- Benzene
- Dichlorobenzene
- Gelatin
- Hydrogen Peroxide
- Turpentine
- Xylene

Use Alcoa Alclad 3S-H14 Heat Exchanger Tubes with fresh, brackish and salt-cooling waters



Outdoors, too, you can count on

"FEATHERWEIGHT" 85% Magnesia

You don't have to pamper "Featherweight" 85% Magnesia! This versatile, dependable insulation does the same efficient job outdoors as well as indoors, on any heating application up to 600°F.

The photograph above shows a part of one of the largest outdoor installations of its kind. The thousands of feet of pipe in this project carry various liquids and gases at many different temperatures. Some of the lines are traced with steam in ½" iron pipe; other lines are steam jacketed. In every case it is important that critical temperatures be held as closely as possible.

"Featherweight" 85% Magnesia, with a weatherproof covering, is an efficient insulation for this application. It will undoubtedly last the life of the plant—and *never* lose its efficiency!

Such service is to be expected of this remarkable material. "Featherweight" 85% Magnesia is structurally strong. It withstands reasonable compression, vibration, and contact. It is physically inert, and its insulating qualities are unaffected by alternate heating and cooling. It is entirely mineral, thus, will not burn. When used along with K&M Hy-Temp Insulation, its usefulness is extended to applications up to 1900°F.

Your Keasbey & Mattison Distributor is an experienced applicator able to answer your questions about "Featherweight" 85% Magnesia. See him, or write us direct for more information.

Nature made Asbestos...

Keasbey & Mattison has made it serve mankind since 1873

K&M Serving mankind in asbestos

KEASBEY & MATTISON

COMPANY • AMBLER • PENNSYLVANIA

HOW Ajax PAYS-OFF IN GAS ENGINE SERVICE

"BETTER GET AN Ajax"

✓ SIMPLICITY

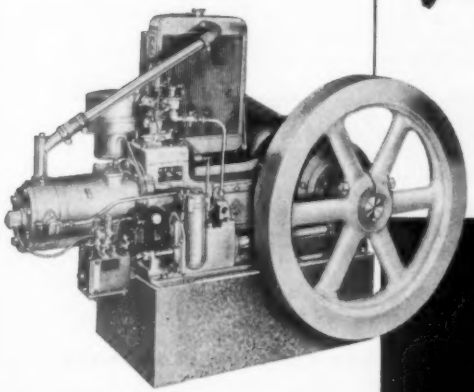
Single-cylinder, two-cycle AJAX design means few wearing parts—cuts out costly repairs and frequent adjustments—stays on the job and saves money!

✓ STURDINESS

Bigger and more rugged parts—larger wearing areas—roller main bearings—efficient thermo-syphon cooling—all in an engine made to make money by productive AJAX performance on the toughest jobs!

✓ LONG LIFE

AJAX long life is famous in every field. Smooth power flow—shorter, single-throw crankshaft—low bearing pressures are a few long-life features that pay dividends on your AJAX investment. *For the detailed, positive facts, see your Supply Man now!*

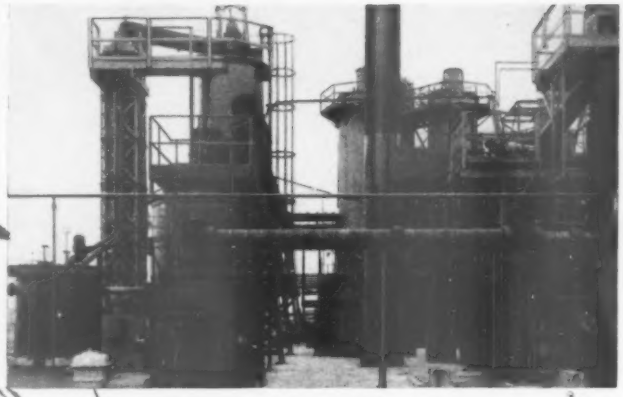


AJAX IRON WORKS

Builders of Gas Engines • Steam Drilling Engines • Industrial Steam Engines

CORRY, PENNSYLVANIA

Oil Field Distributors: THE NATIONAL SUPPLY CO., PITTSBURGH, PA.
R. B. MOORE SUPPLY CO., BOLIVAR, N. Y. • BETHLEHEM STEEL CO., TULSA, OKLA.



"Outlaw" becomes citizen

There may be an "outlaw," known as "refinery waste," in your plant. He may be robbing you of income through the loss of useful products. He may be costing you money in the expense of disposal. Perhaps he is stealing your community good will by stream and air pollution. If you have such "outlaw," reform him with a Monsanto-Ross-Wilde sludge-recovery unit.

A Monsanto-Ross-Wilde unit will produce clean, high-strength SO_2 from sludge acid. Clean, white sulfuric acid can be produced from this SO_2 with or without the addition of SO_2 from the burning of H_2S or elemental sulfur. You can have the unit tied in with your sulfuric acid plant, or, Monsanto will furnish designs for sludge-recovery and sulfuric-acid units as one project.

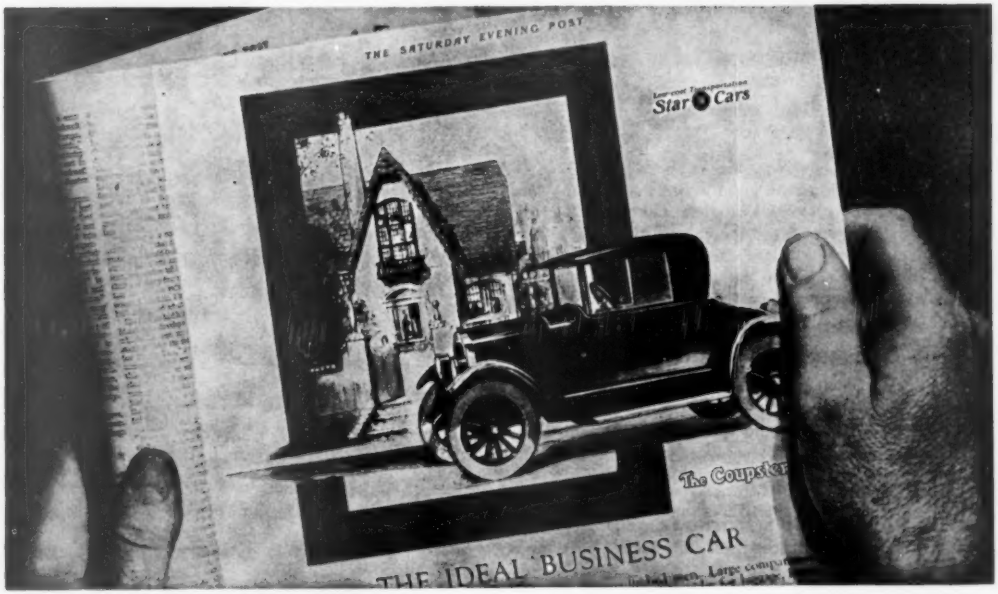
A Monsanto representative will be glad to call to discuss technical features of the M-R-W unit and assist you in an economic study if desired. His services will cost you nothing and will not obligate you in any way. Write, wire or phone MONSANTO CHEMICAL COMPANY, Engineering Sales Department, 800 North Twelfth Blvd., St. Louis 1, Mo.

MONSANTO
CHEMICALS — PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

You still buy gasoline at 1925 prices

If you were to take a sentimental journey back into the mid-twenties by thumbing through a stack of old magazines, you'd find the page below in the *Saturday Evening Post* issue of July 4, 1925. Remember the square-topped cars of those days . . . with their flat windshields, wide running boards, big wooden steering wheels and soft tops?



Remember the prices? Things were a lot cheaper than they are now when almost everything you buy is 'way up in price . . . except gasoline. ¶ Actually, gasoline costs almost exactly the same today—aside from taxes—as it did when the beauty above was an exciting new automobile. ¶ And it's far better gasoline, too. Two gallons today do the work that required three in 1925. ¶ Few industries can match this record. It was made possible by two things: intense competition among oil companies and a steadily increasing efficiency of production. ¶ In the last five years alone, Standard has put more than $644,000,000 into facilities—and another $35,000,000 into technical service and research. This investment helps us make certain that gasoline continues to be one of the best buys in your family budget.

STANDARD OIL COMPANY OF CALIFORNIA ***plans ahead to serve you better***

The story behind the great performance of the Rex® Oil Field Utility Pumps is *simplicity* itself. The fact is, Rex is the simplest self-priming centrifugal pump ever built. There are only 6 *basic* parts—the cover plate (1)—the adjustable air peeler (2)—the impeller (3)—the wearing plate (4)—the pump body (5)—and the leakproof seal (6).

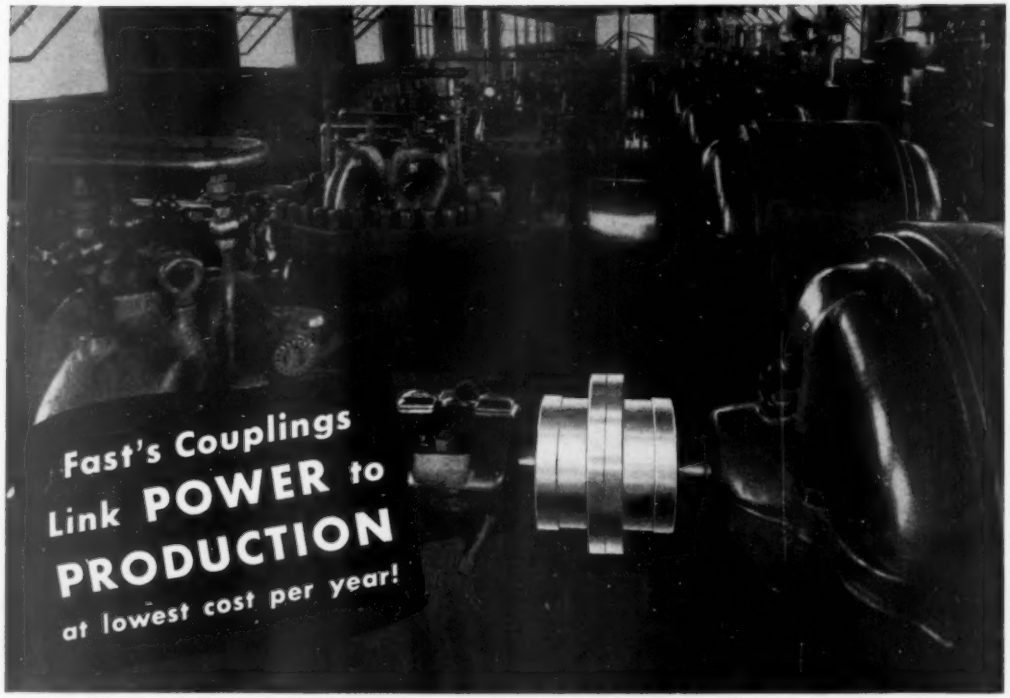
For you, this extreme design simplicity has great advantages:

You get LONGER PUMP LIFE . . . fewer parts mean less wear.

You get ECONOMICAL OPERATION . . . fewer parts to maintain . . . all parts except stationary part of seal can be inspected, maintained or replaced without touching the engine. All this means less chance for trouble . . . far lower maintenance cost . . . more gallons of water pumped per gallon of fuel and per dollar of cost.

You get SUSTAINED EFFICIENCY . . . this pump is designed for quick, easy replacement of all wearing parts to restore new pump efficiency.

REX OIL FIELD EQUIPMENT . . .



Over half a million FAST'S Couplings now in use!

THROUGHOUT industry, Fast's are rated the most dependable couplings on the market . . . to the tune of over half a million now in service! Year in, year out, they continue to *outlast the equipment they connect* . . . save time, maintenance and money by eliminating costly coupling failures.

Actual cases on record show many Fast's Couplings have been in operation for 25 and 30 years without trouble. And every major producer of high-speed equipment now uses Fast's!

Solve your coupling worries! Write today for full details on Fast's Couplings and Koppers Engineering Service to: KOPPERS COMPANY, INC., *Fast's Coupling Dept.*, 380 Scott St., Baltimore 3, Maryland.

Here's How FAST'S Save You Money

Free Service—Koppers free engineering service assures you the right coupling for the job.

Rugged Construction—Fast's still maintains its original design, without basic change or sacrifice in size or materials. Result: freedom from expensive coupling failures.

Lowest Cost per Year—Fast's Couplings usually outlast equipment they connect. Their cost may be spread over many years!

KOPPERS

FAST'S
THE ORIGINAL
GEAR-TYPE
Couplings

INDUSTRY'S STANDARD FOR 32 YEARS

KOPPERS COMPANY, INC., *Fast's Coupling Dept.*
380 Scott St., Baltimore 3, Md.

Gentlemen: Send me Fast's Catalog which gives detailed descriptions, engineering drawings, capacity tables and photographs.

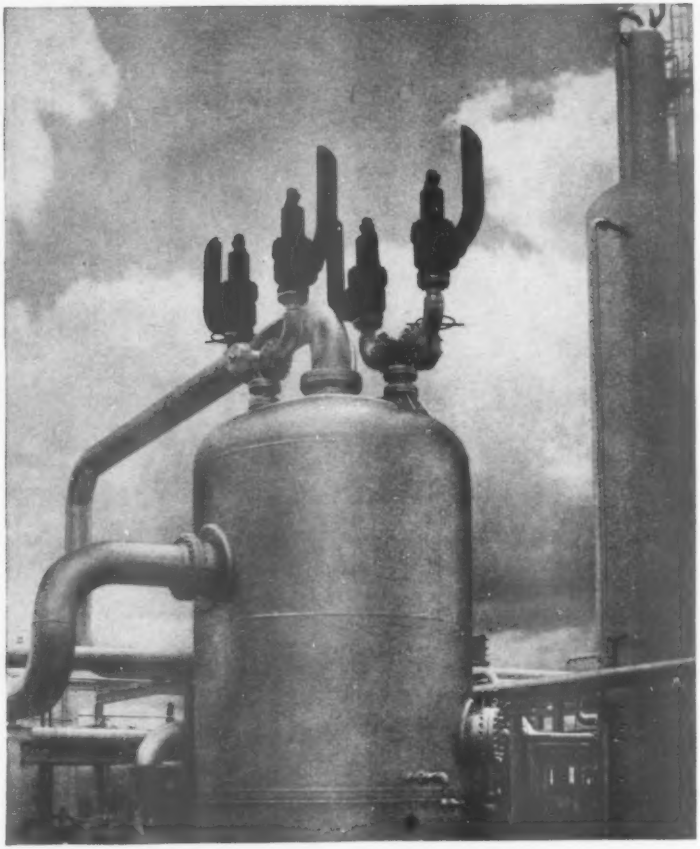
Name _____

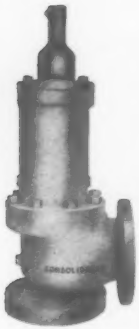
Company _____

Address _____

City _____ *Zone* _____ *State* _____

Consolidated Safety Relief Valves installed on main scrubber at Stanolind Oil & Gas Co., Stano, Kansas.





NO WORRY ABOUT OVERPRESSURES HERE!

DEPENDABLE TIGHTNESS is paramount in valve safety standards. That's why Consolidated Safety Relief Valves are so widely used throughout the process industries. They provide absolute protection against overpressures in piping, pumps, processing equipment and storage tanks—safeguard life, property and production, even in the severest service.

Key to the reliable safety of Consolidated Safety Relief Valves lies in their superior design and construction. Outside bevel seat and floating guide construction permit the disc to seat on a radial seating surface. Leakage due to *discharge piping stresses* is impossible. Complete tightness is assured in all positions within the deflection range. Maintenance and standardization problems are minimized: Consolidated Safety Relief Valves have 25% fewer parts than ordinary safety valves. Service life is outstanding.

For absolute protection against overpressures . . . for continuous, economical performance at the rated capacity—invest in Consolidated Safety Relief Valves. Your local distributor will gladly give you all the facts about their quality and operational features.

CONSOLIDATED SAFETY RELIEF VALVES

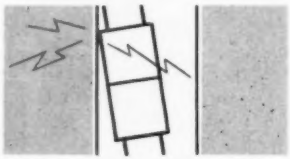
A product of **MANNING, MAXWELL & MOORE, INC.** TULSA, OKLAHOMA

MAKERS OF 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'HANCOCK' VALVES, 'ASHCROFT' GAUGES. BUILDERS OF "SHAW-BOX" CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

PB *protection notes*

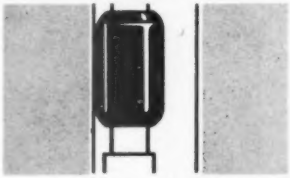
Why protect?

Engineers, unfamiliar with the complex problems of deep well drilling, often ask, "Why use protectors?" The immediate and obvious answer, of course, is *to reduce friction and wear.* Friction in shallow well drilling is much less of a problem, though it does exist. But deep well drilling often means that more than 10,000 feet of drill pipe stretch between the power source on the rig and the bit at the bottom of the hole...and 10,000 feet of unsupported drill pipe is going to bend and corkscrew, tool joints are going to wear against casing walls...if there are no bearing surfaces to prevent wear.



A protector installed above each tool joint pin holds pipe and joints away from the casing, eliminating unnecessary wear and excessive friction. Because there is less friction, the entire string rotates more freely. This means that less power is required to rotate the bit, and in addition means better control of the weight on the bit.

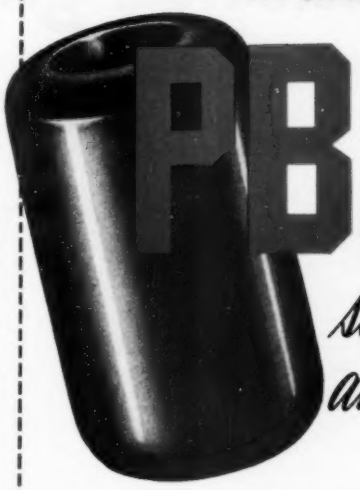
A less obvious reason for installing protectors is *saving time, equipment* and *money.* Reduced friction means less torque and faster drilling. Thus costs are reduced because power requirements are lower, and total drilling time per well is less, *and* savings more than offset the total cost of protection.



Most important reason of all for guarding your rig with casing protectors is the saving of almost irreplaceable drill pipe and casing. Frequently, casing alone accounts for more than a third of the total cost of drilling. In addition, it's just plain hard to buy. It's a big investment, and it can be safeguarded best with protectors. The net result of installing 100% protection with PB Casing Protectors is *saving:* saving in power, in time, in money, and in costly casing and drill pipe.

Make a note now to protect with PB.

it's Canny *to save*



PB CASING PROTECTORS *save drill pipe and casing*

It's no secret that drilling is expensive, and with today's scarcity of steel, drill pipe and casing *has to last!* Casing alone often represents more than a third of the total cost of drilling—*protection is important!* Be certain you get maximum protection... Be safe and sure with PB Protectors!

PB Protectors help you save, because they—

Eliminate unnecessary casing wear
Protect tool joints and save drill pipe
Decrease torque and hoisting loads
Reduce the danger of bent pipe, corkscrewing and twist-offs
Prevent metal-to-metal friction
Lower power requirements
Cut drilling time per job

BE CERTAIN
BE SAFE
Be Canny

Install PB Casing Protectors on your rig... because PB Protectors will help you save!

Available at your nearest supply store or thru your BJ-PB Representative

Your Protection is our Business

PB
OIL FIELD & INDUSTRIAL SPECIALTIES

PB DIVISION
Byron Jackson Co.
P. O. BOX 2017, TERMINAL ANNEX
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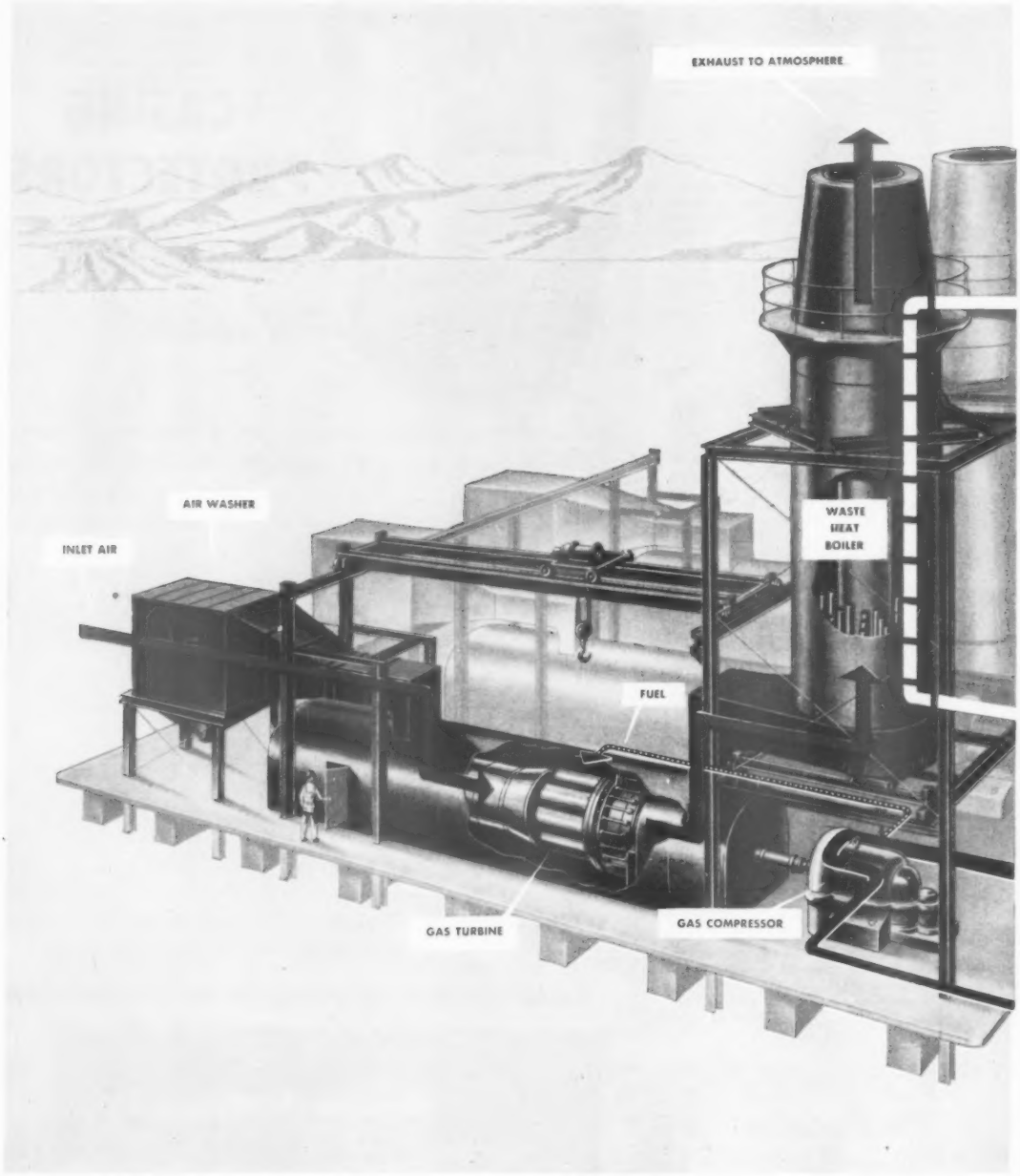
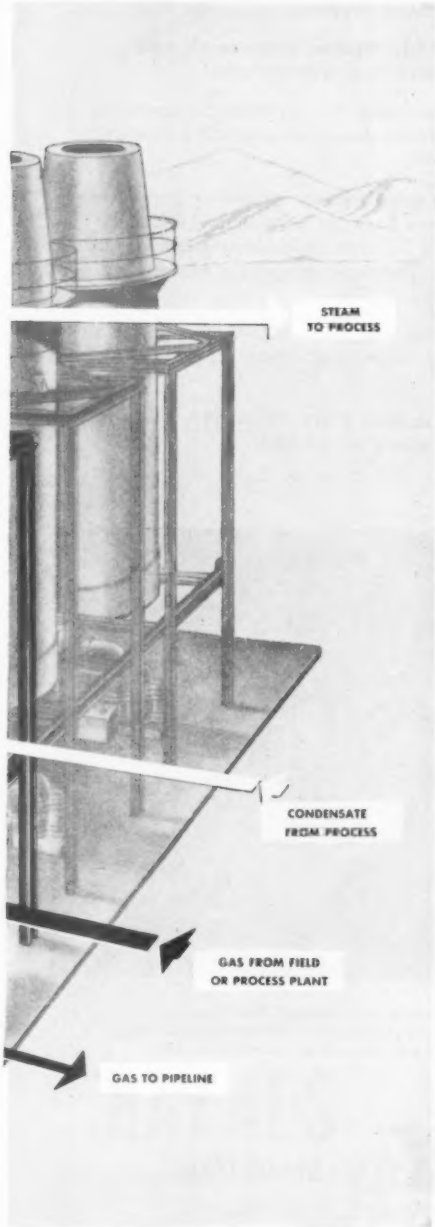
New York, N. Y. Fort Worth - Houston, Texas

G-E combustion gas turbine



for oil and gas fields



Outdoor unit eliminates building cost, generates low-cost steam, can be easily re-located

Latest suggested applications for General Electric's versatile 5000-hp combustion gas turbine is in field gathering and to increase the flow of gathered gas to processing plants.

There are three immediate advantages. *First,* no building is needed. Both the adjustable-speed gas turbine and the centrifugal compressor are designed for outdoor installation. *Second,* this compact G-E power plant can be moved easily from depleted fields to new fields. (A single rigid bedplate permits handling of the turbine with only a crane.) *Third,* each turbine can also generate as much as 30,000 lbs of 225-psig saturated steam at very little cost.

Cuts total yearly costs

Because less personnel is required than with other types of drives, yearly operating costs of a gas turbine driven centrifugal-compressor are very low. Maintenance costs are exceptionally low, too. The comparatively few moving parts of a gas turbine are all rotating. As a result, maintenance is mostly a matter of periodic inspection. Standard-type auxiliaries and accessories are conveniently located to simplify replacement. In addition, the gas turbine can provide up to 25% more horsepower in winter, when demand is greatest.

Available now

In a large Western gas and electric utility, one G-E combustion gas turbine has already logged-in more than 20,000 hours of operation. Another has been driving a locomotive for over two years. A number of others are being installed for gas pipeline pumping. Now their unique advantages are ready to be supplied to field gathering, natural gasoline and cycling plants, and repressuring projects. Your G-E representative will be glad to discuss your applications with you.

FOR YOUR INFORMATION, a 16-page illustrated booklet gives you the full story about G-E's combustion gas turbine. Call your nearest G-E Sales Office for your free copy of Bulletin GEA-5530, or write *Section 661-31, General Electric Company, Schenectady 5, N. Y.*

Combustion Gas Turbines for the Petroleum Industry

GENERAL ELECTRIC

puts the HEAT on heat exchangers

By changing to Yarway Impulse Steam Traps, an oil refinery reports much hotter steam in their heat exchangers **—plus two other important extras:**

(1) They were able to operate the plant with 6 boilers instead of the 8 formerly required.

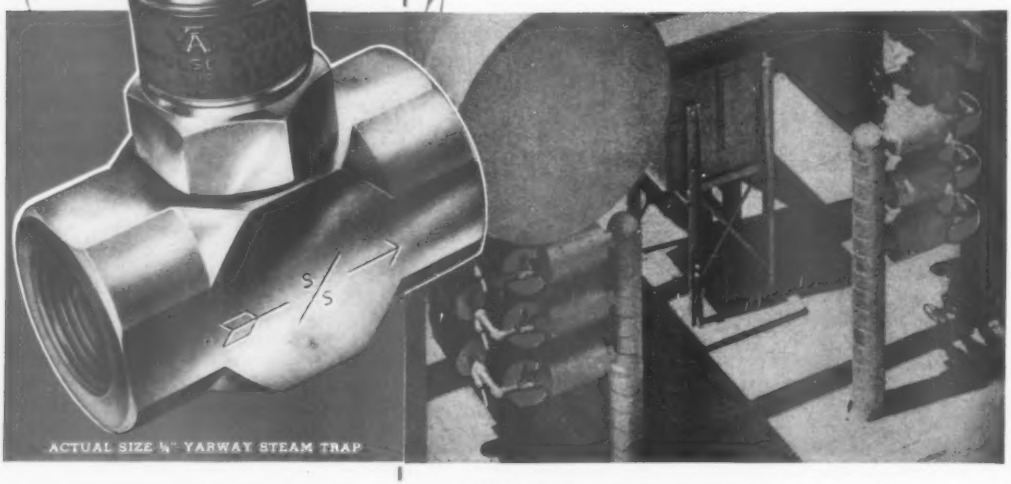
(2) Three men formerly required to service old-type traps can now be used for productive work.

Significant sidelight—these Yarway traps are operating under severe conditions, many outdoors with temperatures often below zero.

Plant after plant is standardizing on Yarway Impulse Steam Traps because Yarways are designed to deliver the most premium B.T.U.'s at top temperatures into your process or product. **They get equipment hotter, sooner ... and keep it hot.**

Other reasons—small size, easy installation, good for all pressures, only one moving part, low maintenance, low price.

Buy your Yarway Impulse Steam Traps from one of the 216 distributors handling this product.



ACTUAL SIZE ¾" YARWAY STEAM TRAP

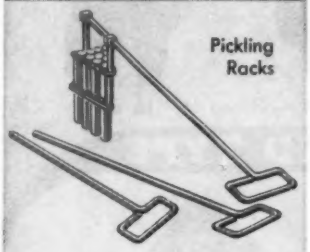
YARNALL-WARING COMPANY
136 Mermaid Ave., Philadelphia 18, Pa.

FREE OFFER. Don't take our word for it. Test Yarway's advantages in your own plant, without cost or obligation. Drop us a card or letter—a trial trap will be delivered promptly.

YARWAY the steam trap
designed with more production in mind

Piston Rods

Bolts



Pickling Racks

Pump Shafts

HAYNES Alloy Bar Stock

Trade-Mark

FOR SEVERE SERVICE CONDITIONS

Four different HAYNES alloys are available in hot-rolled and forged bar stock for the fabrication of parts subjected to heat, corrosion, or oxidation. Each alloy has an unusual combination of properties to combat certain severe service conditions, as indicated by the chart below. Typical parts made from HAYNES alloy bar stock are piston rods, valve stems, pickling racks, pump shafts, bolts, needle valves and forgings such as automotive valves and turbine blades.

Round bars are available in diameters from 3½ in. down to ¼ inch. Rounds larger than 3½ in. in diameter can be obtained as hot forgings.

HAYNES alloy bars can be turned, ground, drilled, tapped, reamed, threaded, and welded.

For further information about HAYNES alloy bar stock, contact the nearest Haynes Stellite Company district office.

USE BAR STOCK OF	FOR RESISTANCE TO
HASTELLOY Alloy B (nickel-molybdenum-iron)	Hydrochloric acid, wet hydrogen chloride gas, sulphuric acid, phosphoric acid, organic acids, high temperatures.
HASTELLOY Alloy C (nickel-molybdenum-chromium-iron)	Nitric acid, free chlorine, acid salts, hydrochloric acid, sulphuric acid, phosphoric acid, organic acids, sulphurous acid, high temperatures.
MULTIMET Alloy (cobalt-chromium-nickel-iron)	Oxidation, high temperatures.
HAYNES Alloy No. 25 (cobalt-chromium-tungsten-nickel)	Oxidation, high temperatures, carburization, wet chlorine, nitric acid.

HAYNES TRADE-MARK *alloys*

"Haynes," "Hastelloy," and "Multimet" are trade-marks of Union Carbide and Carbon Corporation.

Haynes Stellite Company
A Division of
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General Offices and Works, Kokomo, Indiana
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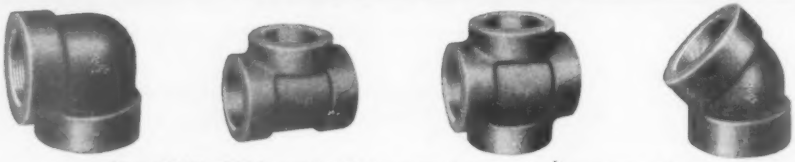
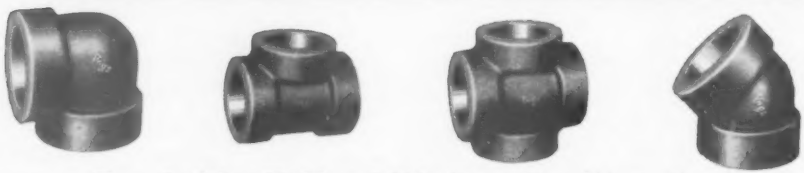
STRENGTH

for Safety and Long-Time Service



For 2000, 3000 and 6000 pounds service — Sizes 1/8" to 6"

SCREW END TYPE



For schedules 40, 80 and 160 pipe — Sizes 1/8" to 4"

SOCKET WELD TYPE

Vogt Ells, Tees, Crosses, etc., are forged from carbon steel or various alloys to meet specific operating conditions. Catalog F-9 will aid you in their selection and proper application.

Shocks and stresses imposed by high pressures and high temperatures are taken in their stride because Vogt fittings are uniform in structure, fine grained, and free from porosity . . . the superior product of laboratory controlled materials and giant forging hammers and upsetters. These properties also give higher resistance to erosive and corrosive conditions, thereby adding to service life expectancy in steam plants, petroleum refineries, chemical plants and related industries.

HENRY VOGT MACHINE CO., INC.
Louisville 10, Kentucky
BRANCH OFFICES: NEW YORK • PHILADELPHIA • CLEVELAND • CHICAGO • DALLAS

Vogt **DROP FORGED STEEL FITTINGS**

AT THE WELL TIME IS MONEY!

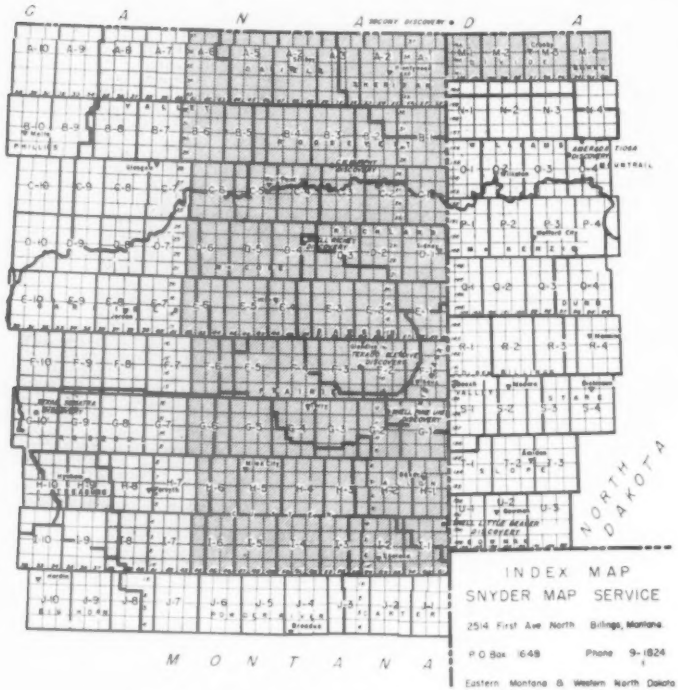
SIMULTANEOUS RECORDING OF ALL CURVES PERMITS IMMEDIATE PRINTING AND DELIVERY OF COMPLETE PRINTS AT THE WELL—

WHY OPERATORS PREFER SCHLUMBERGER!

SCHLUMBERGER WELL SURVEYING CORP. • HOUSTON, TEXAS

Jo Spier

EASTERN MONTANA OWNERSHIP MAPS



All of Eastern MONTANA

10,000,000
(Ten Million)

Acres Are Now Available in Maps

Containing:

12 townships or over on each map.

- All Federal, State, Fee Landowners and Northern Pacific Railway Oil & Gas ownership rights.
- All Oil & Gas Leases of Record with expiration dates indicated.
- All State of Montana Oil & Gas Leases issued.
- All Federal Oil & Gas Leases and Filings applied for.
- All Roads, Towns, Streams, Etc.
- All lots, rivers and county boundaries, sections, townships and range.
- All producing wells and dry holes.
- All Producing wells and drilling wells in Williston Basin of Eastern Montana now mapped and in stock for immediate delivery. Parts or all of SHERIDAN, DANIELS, ROOSEVELT, RICHLAND, McCONE, DAWSON, WIBAUX, PRAIRIE, FALLON and CUSTER Counties, Montana, now available.

MAPS IN STOCK AND FOR SALE, IMMEDIATE DELIVERY. Order by code letter and number A-1, A-2, A-3, A-4, A-5, B-1, B-2, B-3, B-4, C-1, C-2, C-3, C-4, D-1, D-2, D-3, D-4, D-5, E-1, E-2, E-3, E-4, F-1, F-2, F-3, F-4, G-1, G-2, G-3, G-4, H-1, H-2, H-3, H-4, I-1, I-2, I-3, I-4. Thirty-eight (38) maps over 10,000,000 acres. 12 TOWNSHIPS OR OVER IN EACH MAP.

Maps available. Accepting orders. Order by code letter and number A-6, B-5, B-6, C-5, C-6, D-6, E-5, E-6, F-5, F-6, G-5, G-6, H-5, H-6, H-7, H-8, I-5, I-6, I-7, I-8. Twenty (20) maps over 5,500,000 acres. 12 TOWNSHIPS OR MORE IN EACH MAP.

Parts of Valley, Roosevelt, McCone, Prairie, Custer, Fallon, Powder River and Carter Counties, Montana, available soon, as outlined.

NOW IN PROCESS OF MAPPING ALL PRODUCING AND OTHER AREAS OF NORTH DAKOTA. All other interesting areas of Montana to be mapped. Watch for announcement of completion dates.

Handy dependable maps about 30" by 42", scale 1½" to mile, 12 TOWNSHIPS OR OVER IN EACH MAP.

MAPS ARE PRICED **$25.00 EACH**

This is an INDEPENDENT CONCERN. These maps are made available to the public immediately upon completion with absolutely no favoritism to any company or individual as to release dates or price.

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OIL OWNERSHIP MAPS

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Also in stock and for sale at these dealers:

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CIRCLE, MONT.—Mark LaRowe, Gladstone Hotel
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They Say—

More-Complex Research Coming

"Scientific exploration is still in its early youth. Until relatively recent years the real problem was market, not supply; hence much more money and effort have been spent heretofore in devising uses for mineral raw materials than upon the problem of finding them.

"In many respects, therefore, the job of developing adequate theories and exploration tools is hardly more than well started. Enough has been done, however, to show beyond a shadow of doubt that the future of mineral exploration is bright, provided we do not impair the incentive for research and for assuming financial risks.

"The present trend indicates that group action involving the coordination of many skills is rapidly taking the place of the more or less lone workers of earlier days. In all probability the future will call for more group research and still greater integration of scientific skills. Nevertheless, individual courage and individual initiative are likely to remain the guiding spirit."

William E. Wrather, director, U.S. Geological Survey, addressing the Centennial of Engineering, Chicago.

Oil's Effect on Rubber

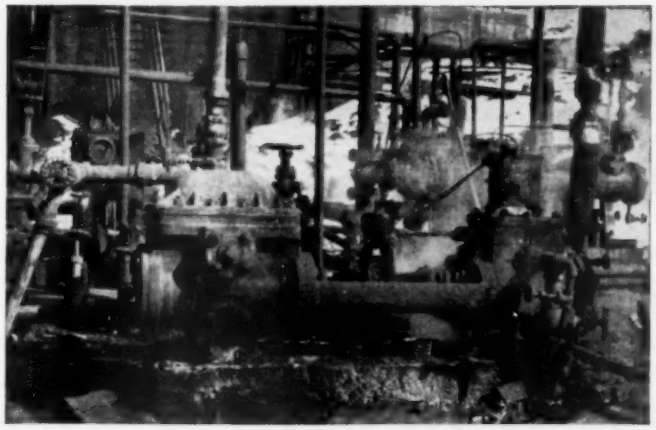
"The rubber industry as we know it today would not exist without petroleum and natural gas . . .

"The effect of petroleum-derived rubber has been to put the United States in a position of self-sufficiency insofar as rubber supplies are concerned. Production capacity is now about one million tons per year. Furthermore, entirely new types of rubber have been developed, and many of these are superior to natural rubber for specific purposes. Continuous research is resulting in an improvement of present types of synthetic rubbers and the development of new ones."

Dr. Gustav Egloff, Universal Oil Products Co., addressing the Davenport, La., Rotary Club.

Bigger Incentive, More Oil and Gas

"Intensive exploration by the petroleum industry has been carried on since 1926, when Congress became alarmed at the dwindling reserves of oil and gas and provided an extra in-



"CHAMBER OF HORRORS"

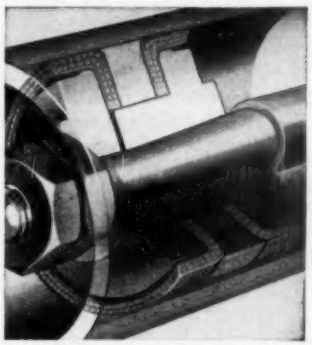
—for anything but a

DARCOVA PUMCUP!

"HOW tough can life get", says ordinary packing inside this pump. Yet, year after year this pump is required to handle acid treated oil products from the base of a heated still to the next purifying process.

Ordinary packing would soon allow slippage to occur—but not Darcova Pumcups. Pumcups retain their efficiency even when severely worn. This installation has operated efficiently for over eight years.

No matter how tough your pumping problem may be, you can do it more efficiently and for lower cost with Darcova Pumcups!



Cross section showing Pumcup installed.

Write for free bulletin No. 4401 on how Pumcups can help solve your pumping problems!

DARCOVA

THE ORIGINAL COMPOSITION CUP

DARLING VALVE & MANUFACTURING CO.

WILLIAMSPORT 1, PA.

PUMCUPS

It's the
"follow-through"
that counts
With peak work cycles becoming more crucial by the day throughout your operations, Twin Disc is all the more aware that supplying industry with high-performance Friction and Hydraulic Drives is only half the picture.
Today, it's the follow-through that counts—and Twin Disc assures that vital follow-through with the fastest, largest and most thorough Repair and Parts Service of any manufacturer of industrial friction and hydraulic drives.
68
To keep your equipment rolling, Twin Disc now has:
SIXTY Parts Stations and EIGHT Factory Branches, fully staffed by experts ready to provide efficient service and to train your own service crews;
$3¼
million inventory of repair parts and complete replacement units; distributed at 68 Strategic locations in every industrial area—throughout the Nation.
PRODUCTION schedule on service parts closely geared to requirements from the field.
Built for a long life . . . Backed for a lifetime
TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
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centive. At that time, the 27½ per cent depletion allowance was written in the federal income tax law, giving incentive to wildcatters as well as the big petroleum companies to drill, drill, drill for new producing wells.

"In the 25 years the incentive has been in effect, United States oil reserves have been increased from 8½-billion barrels to 30-billion barrels in spite of a tremendous increase in yearly production and consumption. Natural-gas reserves have increased accordingly."

Dr. George S. Benson, president of Harding College, Searcy, Ark., in the Harding College Letter.

Canada's Growth

"Discovery of oil has played a large part in Canadian prosperity. More than $1 billion has been spent on oil, since 1947, and another $1 billion will have been spent before the end of 1954. Much of this oil investment—as well as chemical and mining enterprises—is American money. U. S. companies have a total of $7.5 billions invested in Canada.

"What is happening there is what happened in the United States with the opening of the West in the last century. Only it's happening a lot faster in Canada, and all over the place at once . . .

"You can argue, as many will, that Canada's sound money is the result of these developments . . . But if Canada had not pursued sound fiscal and monetary practices, would these developments have taken place?

"In the long run of history it is the record that potentially rich countries with a bad money wallow in poverty while nations without the same resources live well with good money."

Editorial in the Wall Street Journal.

CALENDAR OF EVENTS

OCT.

9-10 California Natural Gasoline Association, twenty-seventh annual fall meeting, Ambassador Hotel, Los Angeles.

11 American Institute of Chemical Engineers, Oklahoma section, Tulsa University.

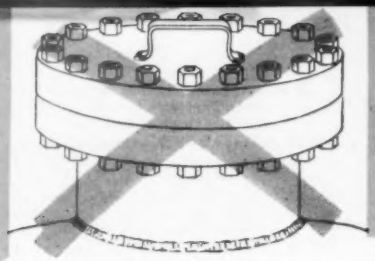
12-18 Oil Progress Week.

13-15 Texas Mid-Continent Oil and Gas Association, thirty-third annual meeting, Hotel Texas, Fort Worth.

13-17 American Institute of Electrical Engineers, fall meeting, New Orleans.

16-17 Western Petroleum Refiners Association, regional meeting, Garrett Hotel, El Dorado, Ark.

6-19 Permian Basin Oil Show, Odessa, Tex.



Save the cost of a man-hole and additional tank openings...

Utilize a

BS&B MODEL VVH Pressure-Vacuum Vent Valve

DOES DOUBLE DUTY

1. Replaces a man-hole cover

Big enough to admit

2. Gives pressure-vacuum protection

even this 200 pounder

Spare no materials and expense to make the equipment do the job for which it's needed and intended . . . This is the code of BS&B engineers.

On the other hand, they're very conscious of saving the customer money wherever they can. A perfect example is the BS&B Model VVH-Pressure-Vacuum Vent Valve in the 20" and 24" sizes. It does double duty by eliminating a man-hole on your tank deck and provides relief against excessive pressure and vacuum.

The Model VVH is used as a secondary relieving device on atmospheric storage tanks containing flammable materials . . . or as a primary relief device on tanks where non-flammable material is involved.

Reduce Your Maintenance Costs

The BS&B Model VVH-Pressure-Vacuum Vent Valve permits easy access to inside of your tank . . . just lift the valve bonnet . . . no need to disengage the bonnet from the valve body. No man-hole cover to fall off and damage equipment or injure personnel, no bolts to get lost; minimum of moving parts! Write for BS&B Bulletin No. E-601 giving complete information.

SIZES AND MINIMUM-MAXIMUM PRESSURE SETTINGS

Valve Size	Opening Pressure	Vacuum Opening	Maximum Opening Pressure
Inches	Ozs.	Ozs.	Ozs.
2	2.0	0.5	16
3	2.0	0.5	16
4	1.75	0.5	16
6	1.75	0.5	16
8	1.75	0.5	16
10	1.75	0.5	16
12	1.75	0.5	10
16	2.0	0.5	8
20	2.0	0.5	6
24	1.5	0.5	4

NOTE: Internal setting can be reduced to 0.5 oz. by inserting a counter weight to valve bonnet.

Standard *Material Specifications

Bonnet: Cast aluminum
Body: Cast iron
Retaining ring: Cast aluminum
Vacuum ring: Steel
Retaining ring spring: Steel
Plug: Synthetic rubber (Buna-N)
Flange drilling: 150 # ASA

*Any component part of the valve assembly can be constructed of materials resistant to your tank vapors.

SAFETY BS&B HEADS OUR 60TH YEAR

BLACK, SIVALLS & BRYSON, INC.

7500 East 12th Street — Kansas City 3, Missouri

Safety Head Division — Dept. 2-A10

No more sleepless nights worrying about "downtime"...

install corrosion resistant

SARAN LINED steel pipe

You'll sleep better, and your manufacturing operations will be better *and more continuous* once you've installed corrosion-resistant, saran lined steel pipe. Downtime will be cut to a minimum, because this rigid pipe has high pressure strength and durability which mean dependable, long-term service. Easily installed saran lined steel pipe can be cut and threaded in the field—no need for special tools or handling. Be sure to consider saran lined steel pipe wherever superior resistance to most chemicals and solvents is demanded. *Saran lined steel pipe is manufactured by The Dow Chemical Company.*

Write to the Distributor:

SARAN LINED PIPE COMPANY

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product

20	Texas Independent Producers and Royalty Owners Association, mid-year directors' meeting, Austin.
20-23	Society for Non-Destructive Testing, Inc., annual meeting, Hotel Sylvania, Philadelphia.
22-24	Society of Automotive Engineers, national transportation meeting, Hotel William Penn, Pittsburgh, Pa.
23-24	American Institute of Mining and Metallurgical Engineers, petroleum branch, West Coast fall meeting, Statler Hotel, Los Angeles.
23-24	Independent Petroleum Association of America, annual membership meeting, Skirvin Hotel, Oklahoma City.
24	Institute of Gas Technology, annual meeting, Chalfonte-Haddon Hall, Atlantic City.
24	Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex.
27-28	Society of Exploration Geophysicists, Eastern Canada meeting, King Edward Hotel, Toronto, Ont.
27-31	American Gas Association, annual convention, Atlantic City, N. J.
30-31	American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists, annual fall meeting of Pacific sections, Statler Hotel, Los Angeles.
30-Nov. 1	Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver.

NOV.

3- 4	Society of Automotive Engineers, national diesel engine meeting, Chase Hotel, (tentative), St. Louis, Mo.
5- 7	Industrial Management Society, 16th annual time and motion study and management clinic, Sheraton Hotel, Chicago.
6- 7	Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.
6- 8	Gulf Coast Association of Geological Societies, annual fall meeting, Hotel Driscoll, Corpus Christi, Tex.
8-13	Oil Industry Information Committee, Conrad Hilton Hotel, Chicago.
10-13	American Petroleum Institute, thirty-second annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.
13-14	Society of Exploration Geophysicists, midwestern meeting, Texas Hotel, Fort Worth.
17-18	American Institute of Electrical Engineers, subcommittee on electrically operated recording and controlling instruments, technical conference, Benjamin Franklin Hotel, Philadelphia.
20-21	National Association of Corrosion Engineers, western region, second annual corrosion conference, Biltmore Hotel, Los Angeles.
20-22	Instrument Maintenance Short Course, jointly sponsored by Southern California Meter Association and Los Angeles Harbor Junior College.
21	Natural Gasoline Association of America, district meeting, Herring Hotel, Amarillo, Tex.
30-Dec. 5	American Society of Mechanical Engineers, Statler Hotel, New York City.

DEC.

1- 3	New Mexico Oil and Gas Association, annual meeting, Albuquerque.

1-6 American Society of Mechanical Engineers, twentieth National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York.

5- 6 Interstate Oil Compact Commission, winter meeting, Wichita, Kans.

7-10 American Institute of Chemical Engineers, annual meeting, Hotel Cleveland (Hqs.) and Carter Hotel, Cleveland.

1953

FEB.

2- 4 Missouri Petroleum Association convention, President Hotel, St. Louis.

27 Natural Gasoline Association of America, regional meeting, Scharbauer Hotel, Midland, Tex.

MARCH

2- 6 American Society for Testing Materials, spring meeting, Statler Hotel, Detroit.

4- 6 American Petroleum Institute, division of production, Southwestern district spring meeting, Hilton Hotel, Fort Worth.

8-11 American Institute of Chemical Engineers, Buena Vista Hotel, Biloxi, Miss.

15-17 American Petroleum Institute, division of production, Eastern district spring meeting, William Penn Hotel, Pittsburgh.

16-20 National Association of Corrosion Engineers, Hotel Sherman, Chicago.

18-20 American Petroleum Institute, division of production, Mid-Continent district meeting Mayo Hotel, Tulsa.

30-31 Texas Independent Producers and Royalty Owners Association, annual meeting, San Antonio.

23-26 American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists, annual meeting, Rice and Shamrock Hotels, Houston.

30-Apr. 1 Mid-West Gas Association, Broadmoor Hotel, Colorado Springs, Colo.

APRIL

8-10 American Petroleum Institute, division of production, Eastern district meeting, William Penn Hotel, Pittsburgh.

15-17 National Petroleum Association, mid-year meeting, Cleveland.

21-23 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.

26-29 American Institute of Chemical Engineers, Chemical Institute of Canada, joint meeting, Royal York Hotel, Toronto, Ont.

27-28 Independent Petroleum Association of America, mid-year meeting, Jefferson Hotel, St. Louis.

Apr. 29-May 1 Natural Gasoline Association of America, annual convention, Rice Hotel, Houston.

MAY

4- 5 American Petroleum Institute, division of marketing, midyear meeting, Baker Hotel, Dallas.

11-13 Southern Gas Association, Jung Hotel, Hotel, New Orleans.

14-23 International Petroleum Exposition, Tulsa.

24-27 American Gas Association, production and chemical conference, Hotel New Yorker, New York City.

28-29 Natural Gas and Petroleum Association of Canada, London, Ont.

REPUBLIC NATIONAL BANK
OF DALLAS, TEXAS

Statement of Condition, September 5, 1952

RESOURCES

Cash and Due from Banks	$133,499,272.78
U. S. Government Securities	79,811,618.77
State, Municipal and Other Securities	2,939,092.16
Stock in Federal Reserve Bank	1,275,000.00
Loans and Discounts	226,205,602.19
Bills of Exchange and Commodity Loans	13,527,140.27
Real Estate — New Building and Equipment	6,376,179.42
Acceptances and Letters of Credit	4,613,679.93
Total	$468,247,585.52

LIABILITIES

Capital	$ 21,000,000.00	
Surplus	21,500,000.00	
Undivided Profits	5,322,189.78	47,822,189.78
Reserve for Monthly Dividend, Payable October 1, 1951		199,500.00
Reserve for Contingencies		3,306,883.42
Reserve for Taxes, Etc.		4,003,149.52
Acceptances and Letters of Credit		4,613,679.93
Deposits:		
Individual	288,128,786.15	
Banks	108,794,721.80	
Government	11,378,674.92	408,302,182.87
Total		$468,247,585.52

★ ★ ★

Assets of the Republic National Company, with capital stock of $3,000,000, are not included in above statement. The Company owns majority stock in the following banks located in Greater Dallas:

FAIR PARK NATIONAL BANK
GREENVILLE AVENUE STATE BANK
HIGHLAND PARK STATE BANK
LAKEWOOD STATE BANK
NATIONAL CITY BANK
OAK CLIFF BANK & TRUST CO.
OAK LAWN NATIONAL BANK

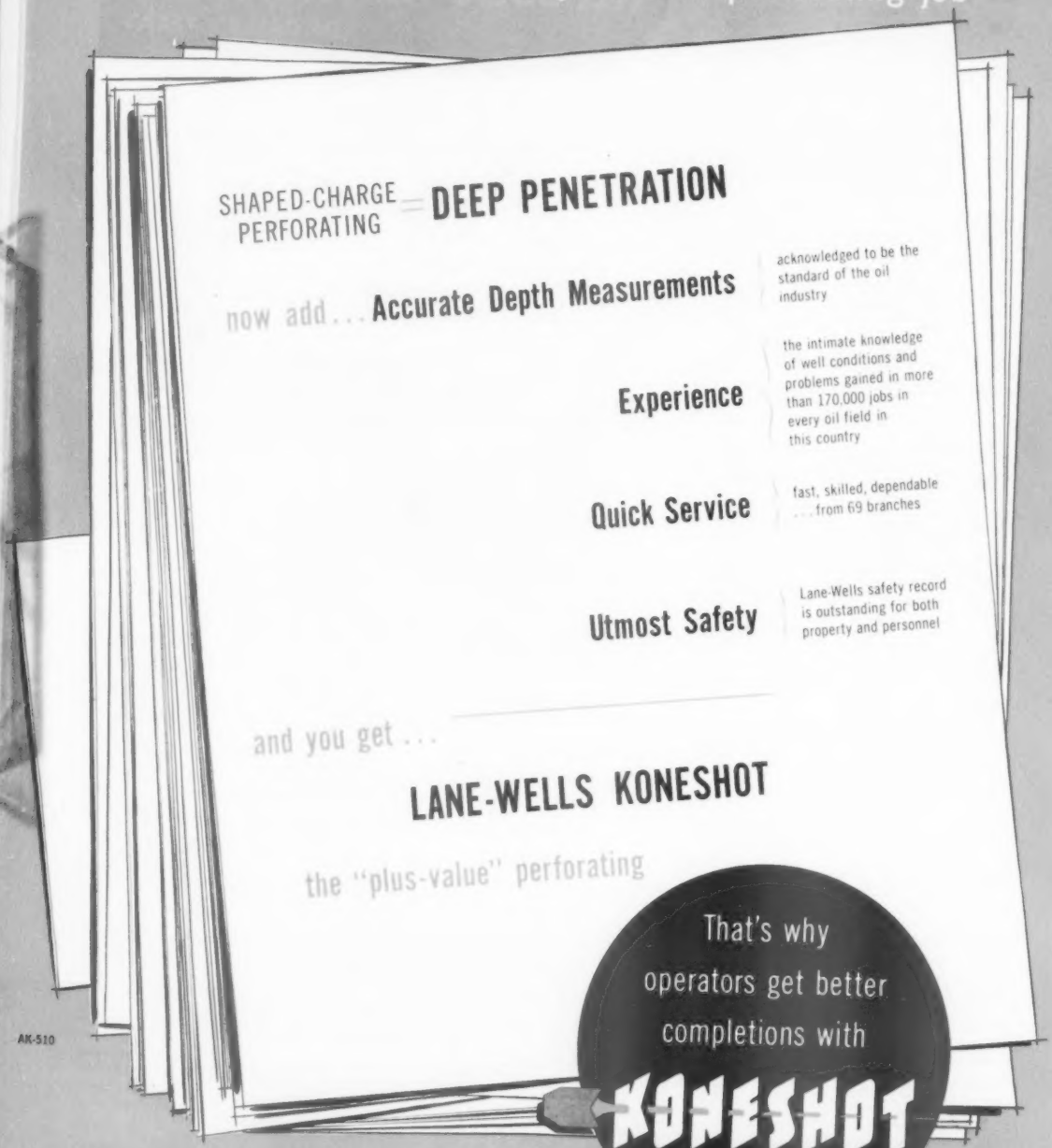
Resources of the Republic National Bank and the above Banks aggregate $588,277,997.00

"We Bank" . . . the strong, friendly bank

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

2 Minutes of Easy Addition

can pay big dividends on your next perforating job


SHAPED-CHARGE PERFORATING = DEEP PENETRATION
now add... Accurate Depth Measurements
acknowledged to be the standard of the oil industry
Experience
the intimate knowledge of well conditions and problems gained in more than 170,000 jobs in every oil field in this country
Quick Service
fast, skilled, dependable ... from 69 branches
Utmost Safety
Lane-Wells safety record is outstanding for both property and personnel
and you get ...
LANE-WELLS KONESHOT
the "plus-value" perforating
That's why operators get better completions with
KONESHOT

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THE OIL AND GAS
JOURNAL
TULSA, OKLAHOMA

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JOURNALLY Speaking

Some Basement

CALGARY, Alta.—When the late great Rudyard Kipling visited this part of the country and observed natural gas burning from fissures near Medicine Hat, he remarked that Alberta had "all hell for a basement."

Present-day Albertans take a more practical, if less poetic, view of the underpinnings of their province. They realize that the basement under their flat and fertile wheat lands is composed of several thousand feet of sedimentary rocks which contain untold amounts of oil and gas.

And instead of considering this basement as containing the fires of hell, they think of it as providing them with a sort of heaven on earth, and they intend to make it supply them with a lot of the good things of life. They anticipate petrochemical and other industries flocking in and bringing great prosperity.

How much of this dream will come true only time will tell, but already the provincial government, once nearly bankrupt, is almost out of debt. And largely because of Alberta's oil, the Canadian dollar is now worth $1.05 in United States currency. After being on the short end of the dollar exchange for a good many years, this new position is mighty pleasing to Canadians, though it is a sad blow to the pride and pocketbook of visiting Americans.

Almost Texas

ALBERTA is often called "The Texas of Canada," and it is—almost. It is almost as big as Texas, almost as flat, has almost as many wide open spaces, almost as big cattle ranches, and almost as many good places to drill for oil. Also, Alberta is almost as independent of the rest of Canada as Texas is of the rest of the United States.

Albertans talk and act like Texans, too. They have their own brand of western drawl in their speech, and they are breezy, informal, optimistic, and very proud of their region. In fact, their local pride and optimism sometimes run away with them, and some of their accounts of their oil discoveries, natural resources, and growth possibilities have a close resemblance to a type of conversation which has come to be identified with Texas.

One reason for this may be the large number of transplanted Texans who have come up here to help develop the province's oil and gas resources. They're all over the place and at first meeting they seem indistinguishable from the native Albertans. But, true to form, they never fail to state that they come from Texas. It's almost as easy to find a Texas oil man in Alberta as it is in Texas.

Nature's Laboratory

ALBERTA is the ideal place to explore for oil, we are told, because the Rocky Mountain upthrust along the western border is nature's geological laboratory and showcase.

After examining cores, well logs, and seismic charts all week a geologist can spend the week end in the mountains and see the very strata he is trying to reach under the prairie many miles to the east. For example, a geologist on the golf course at Banff Springs Hotel can look up from the green and see exposed on the face of the mountain above him an outcrop of the Devonian formation which produces oil in Redwater field 3,000 ft. below the surface.

This is the best excuse we ever heard for a geologist to get away to the mountains or the golf course for a few days.

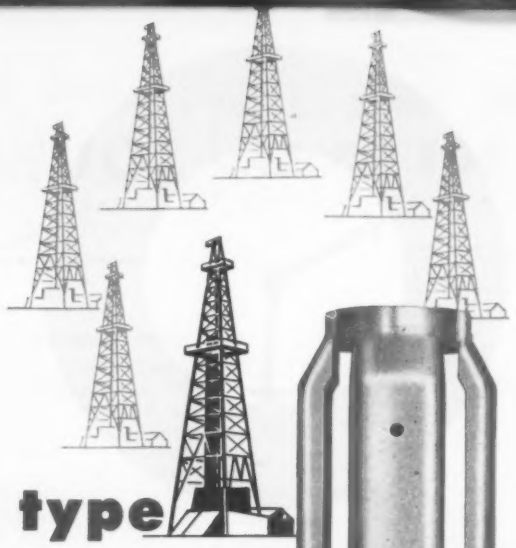
Geographical Detail

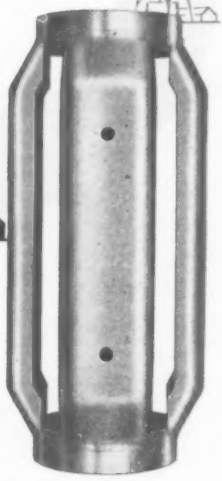
SINCE this was our first visit to Canada we were constantly embarrassed by our ignorance of local geography, and felt rather silly about having to ask where various places are with relation to other localities.

But our ego was greatly flattered and the score was evened up by an item in a local paper which told of a delegation of Desk and Derrick girls taking off to attend the club's annual convention "in Houston in the Texas Panhandle." (Amarillo papers please copy.) —*Henry D. Ralph*

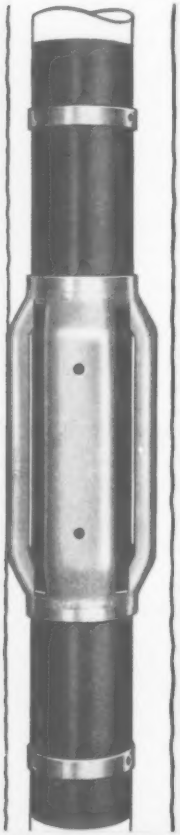
sooner or later you will want

BAKER rigid type CASING CENTRALIZERS





In line with the long established "Baker Policy" of furnishing the most efficient means of centering your casing, the new Baker RIGID TYPE Casing Centralizer is offered to supplement the outstanding Baker SPRING TYPE Centralizers.



Baker RIGID TYPE Casing Centralizer, Product 9131

CHOOSE THE "TYPE" YOU NEED

If your formations have a tendency to slough off, form cavities, or to wash out, you should continue to use Baker SPRING TYPE Casing Centralizers. The flexibility of the springs permits them to expand and compensate for these variations in hole size and still provide *maximum* centering force.

However, in harder formations, the Baker RIGID TYPE Casing Centralizer (Product No. 9131) is the one to use.

EASY TO INSTALL—POSITIVE CENTERING

The Baker RIGID TYPE Casing Centralizer normally is merely slipped over the casing and allowed to travel freely between collars. If exact spacing is desired, the Stop Collars are spot welded to the casing to prevent *vertical* movement of the centralizer, but to permit *free rotation* of casing while the *centralizer remains stationary*.

Baker RIGID TYPE Casing Centralizers are available to run on casing from 5½" to 9⅝" O.D., to center casing in well bores with minimum gauge from 7⅞" to 12¼". The inflexible "pads" ensure *positive clearance* between the casing and the wall of the open hole when casing is being cemented in harder formations.

FOR RIGID TYPE CASING CENTRALIZERS

BAKER OIL TOOLS, INC.

HOUSTON • LOS ANGELES • NEW YORK

How price ceilings hurt oil consumers

THE big "rhubarb" over the furnace-oil situation on the East Coast is due entirely to the system of rigid price ceilings imposed by the Office of Price Stabilization.

It's ridiculous, really. Tanks of refiners and primary distributors are so full of furnace oil that output may have to be curtailed, but there is plenty of empty storage in the hands of consumers and jobbers who will be crying for furnace oil next winter when transportation is difficult.

Why doesn't the oil move to where everyone knows it will be needed in a few months? Because buyers are lulled into inactivity by the OPS assurance that the price won't go up.

In a free market the price would be low in the summer and higher in the winter. The total net bill would average out about the same, but consumers and jobbers would fill up and thus make room for refiners to continue production at the needed rate.

WHEN ceilings are fixed, the factor of price cannot operate to equalize distribution and balance supply with demand. The furnace-oil mess is just one example of how consumers and producers alike are injured by adherence to a rigid schedule of prices on petroleum products which was arbitrarily frozen as of a certain day a couple of years ago.

There is no plausible, legitimate reason for continuing price controls on petroleum anywhere between the well and the consumer's tank at present. There is plenty of crude and plenty of refining capacity to meet all anticipated demands for the principal products this winter, and also plenty of competition to keep prices from getting out of hand in a free market.

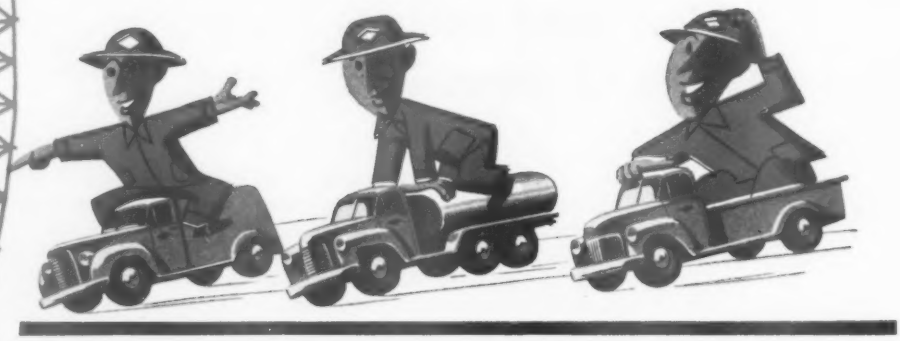
Most petroleum products are selling below OPS ceiling prices in most areas of the country. The exceptions are local situations where a little increase in price would bring more supplies into a tight market. If there were no ceilings, a few consumers might pay a little more for certain products over short periods, but offsetting reductions on other products and in other places would keep the weighted average price of all petroleum products about the same.

SOME people may ask: If many oil prices are below ceilings and if prices would not advance generally with controls removed, what harm does it do to retain price control?

The harm lies in lack of flexibility in the market. In normal times scores of refiners and distributors adjust their output and shipments in accordance with delicate local price changes. The result is that there are no real shortages and no excessive prices.

If there ever was any justification for price ceilings on petroleum since the Korean war started, there certainly is none now. They are doing consumers more harm than good. They should be dropped immediately.

new production from old wells



Reconditioning by Dowell Service

BOOSTS PRODUCTIVITY AND PROFITS

Take a look at your old wells. They may be capable of added production if properly reconditioned. This is particularly important when steel or other shortages prevent new drilling.

When old wells have declined in productivity, been deepened or plugged back to a new horizon they are often perfect subjects for Dowell's Reconditioning Service. Wells completed in many different formations have been improved by Dowell's treating techniques.

Your nearest of over 90 Dowell offices is well staffed with engineers trained in expert reconditioning. Now is the time to call Dowell for work on old wells.

Ways to New Production

ACIDIZING An old well, completed in the Miocene sand, had declined abnormally from a large initial production to 20 BOPD. This was due to plugging by both paraffin and accumulated clay-like materials. Dowell treated the well with Formation Cleaner then acidized with Mud Acid. Result: production was increased to 180 BOPD.

STRATA-FRAC This well's initial production was 19 BOPD in March, 1950. While the well had not declined, it was not considered good for its location. Various remedial methods failed to boost oil flow. Then Dowell treated the well with Strata-frac. Result: production was increased to 45 BOPD with payout time estimated at 36 days.

PLUS THESE EXTRA AIDS TO RECONDITIONING

Etching Acid • Strata-lift • Channeling Acid • Sand-frac • Temporary Plugging
Selective Acidizing • Permeability Surveys • Spinner Surveys • Water Locating
Caliper Surveys • Temperature Surveys • Glass Gun Perforating

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Acidizing • Jel-X • Electric Pilot • Perfo-Jet • Paraffin Solvents • Jelflake
Bulk Inhibited Acid • Chemical Cleaning for Heat Exchange Equipment

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Look to DOWELL

FOR OIL INDUSTRY CHEMICAL SERVICE

THIS WEEK

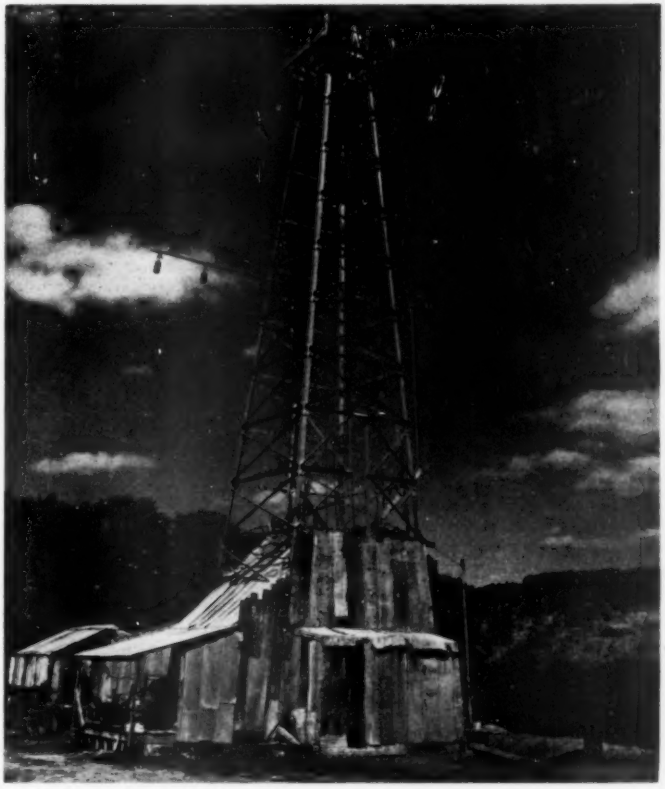
PRODUCTION.—New method of completing and working over wells without need for a drilling rig is described by Humble engineers before A.I.M.E. meeting. . . . New development uses wire-line tools for perforating, cementing, plugging back. . . . Tools are run through tubing, which is left undisturbed. . . . ¶Tide Water completes Saskatchewan wildcat for 800 bbl. daily, biggest indicated producer in the province. . . . ¶Rank wildcat in Montana finds heavy oil in Tensleep, the first discovery of oil in this area of Central Montana. . . .

DRILLING. — Program projected by PAD for 1953 will require 354 more rigs than are operating this year, A. W. Thompson tells A.A.O.D.C. attendees in Oklahoma City. . . . The PAD goal of 55,000 wells in that year, he says, will require expenditures of $949,000,000 and will mean drilling about 214,500,000 ft. of hole—based on an average depth of 3,900 ft. per well. . . . ¶Texas Railroad Commission forecasts new completions record this year in Texas if no more shortages of steel crop up. . . . ¶Richardson & Bass move huge drilling barge on location in the Blind Pass area off Texas. . . . Barge claimed capable of handling any known or contemplated drilling job in the Gulf Coast region. . . .

INTERNATIONAL.—Shell lays eight lines simultaneously under Suder Elbe River. . . . Quarter-mile crossing made by use of locomotives to pull launching assembly to which lines had been clamped. . . . ¶British study Mossadegh's latest proposal for nationalization-issue settlement. . . . Iranian premier says his offer is good for 10 days only and must be accepted in its entirety. . . . ¶Shell acquires exploratory concession outside the 3-mile limit of Abu Dhabi, a Trucial Coast shaikhdom. . . . ¶American Independent general manager says exploratory program carried out to date in Kuwait-Saudi Arabia Neutral Zone has cost approximately $30,000,000. . . .

GOVERNMENT.—Cartel case opens in Washington in a flurry of motions by oil-company attorneys. . . . Companies ask dismissal of grand jury, quashing of subpoena demanding company records, movement of investigation to New York. . . . Attorneys point out 14 of 23 grand jury members are government employes, 8 of them from agencies directly concerned with the charges. . . .

INDUSTRY.—California petroleum industry to spend more than $200,000,000 in the next 1½ years for expansion and modernization of refining and petrochemical facilities. . . . Bulk of expenditures will be poured out by five major companies—California Standard, Shell, Richfield, Union, and General Petroleum. . . . ¶First crude to go to the West Coast from the Canadian prairie producing regions arrives in British Columbia refining area on 27-tank car train. . . . Shipments to be continued until Trans Mountain crude trunk is in operation next fall. . . .



NEW WORLD'S RECORD has been set by this rig in Chemung County, New York, 18 miles south of Ithaca. It reached a depth of 10,666 ft. on September 19, the deepest penetration ever made by a cable-tool rig, and was drilling ahead. New York State Natural Gas Corp., which owns the well, said it might be bottomed at 11,000 ft. or deeper. Previous record was held by Manufacturers Light & Heat Co., which went to 10,312 ft. in Summit gas field in Fayette County, Pennsylvania. The New York State Natural well is a wildcat looking for natural gas. Acme Drilling Co. is doing the drilling. A picture of the drilling crew appears on page 169.

TRENDS.—Primary stocks of the four major products on September 27 were 12,750,000 bbl. greater than last year despite the low position of 30,000,000 bbl. under last year at the end of May. . . . Stocks are 8,000,000 bbl. above peak for last year, reached on October 27. . . . Stock increases in the past 2 weeks amounted to 11,640,000 bbl. compared with 3,870,000 bbl. in the same weeks last year.

ACTIVITY.—Production of crude and lease condensate for week ended September 27 averaged 6,508,475 bbl. daily, up 1,625 bbl. daily. . . . ¶Total well completions for the week increased 35 wells to 837. . . . ¶Wildcat completions totaled 210 wells compared with 203 for previous week and 198 in same week last year. . . . ¶Rotary rigs operating in United States decreased 22 rigs to 2,427 on September 29.

Permanent Completions

Humble technologists describe development making drilling rig unnecessary for completion and workover operations

Walter Rose

HOUSTON. — A major development in completion and workover practice which makes possible a permanent-type well-completion installation was announced last week by engineers of Humble Oil & Refining Co.

This development provides a procedure whereby the tubing and well-head equipment need be set in place only once in the life of the well. Completion and subsequent workovers can then be performed through the tubing and newly developed wire-line auxiliary equipment.

T. A. Huber, chief reservoir engineer in Humble's petroleum-engineering division, and his associate, G. H. Tausch, a senior petroleum engineer, described the details of this work in an address before the annual meeting of the American Institute of Mining and Metallurgical Engineers' petroleum branch held here October 1-3.

Permanent - type well completion is now practical, they said, greatly reducing completion and workover costs. Among other things, this means wells can be plugged back and perforated without disturbing the tubing setting.

Audience reaction to Humble's paper on "Permanent-Type Well Completion" was generally enthusiastic. One major-company representative, for example, said the new method should reduce costs for plugging back and recompleting to between one-half and one-third of present costs. This opinion was based on his company's experience with trial use of the tubing-type perforator described by Huber and Tausch in the Humble paper, and also by M. P. Lebourg and G. R. Hodgson of Schlumberger Well Surveying Corp. in a companion A.I.M.E. paper. For comparison, the Humble authors declared that it was their experience that a 75 per cent reduction in workover costs could be achieved.

Tubing-type perforator . . . Under the permanent-type well-completion method the tubing is set open-ended in the well before the casing is perforated. The Schlumberger and Humble authors both described a new wire-line perforating tool which is small enough to pass through the tubing and powerful enough to perforate the casing. This tool has already been tested in more than 200 cases, the authors reported. In only two cases was there a failure to obtain the desired penetration.

The gun fires shaped charges upward at a 45° angle. An expendible carrier of a drillable material such as brass or aluminum is used to achieve maximum space for the charges. As the authors point out, this carrier shatters "at the time of firing, leaving only harmless fragments at the bottom of the hole."

For 2-in. tubing, the outside diameter of the carrier is 1¾ in. The length, of course, depends on the interval to be perforated, and the authors reported that in one case a 31-ft. carrier containing 155 shots was successfully employed. The design calls for five shots per foot of carrier, with all shots fired simultaneously to achieve a spiral pattern of holes. While the carrier's resistance to collapse has not been found to be a limiting factor, the authors note that it can withstand bottom-hole pressures in excess of 7,000 psi.

New completion method . . . The described procedure involves running the production casing and cementing through the producing zone.

Tubing is then run into the well and used to replace the mud with water or oil to balance the bottom-hole pressure. The open end of the tubing is positioned above the zone to be perforated. After the christmas tree and flow lines are installed, the drilling rig can be moved since all subsequent operations are performed by wire line.

In perforating, the gun is lowered through the tubing, and a special magnetic casing collar locator is used so the gun will be positioned opposite the desired zone. Since the lubricator can be closed before firing, it is possible to withdraw the collar locator and head. This means the well can be immediately opened to the tanks on completion.

Techniques proposed by the authors when upper zones are to be perforated permit recompletions without removal of the tubing and without placing a rig on the well. Wells perforated by this method, they said, in many cases have what might be termed a "higher than usual" potential. This was ascribed to the use of shaped charges and the employment of angle shooting.

All in all, these A.I.M.E. papers assert that the perforating and completing and workover jobs are done under optimum reservoir conditions. For there is only a slight differential between the formation and the production string at the time of shooting. Moreover, it is pointed out that no contaminating fluid need ever touch the formation subsequent to perforating.

Other developments . . . How to cement a well without a drilling rig also was described by the Humble authors.

This is accomplished through use of a newly designed retrievable tubing extension. By lowering the extension on a wire line, the tubing bottom can, in effect, be varied, making it possible to plug back a lower zone, wash out the cement, and then after removal use the perforating tool to bring in an upper zone.

They also described the use of newly designed tubing packers as either squeeze or production packers. These can be arranged to be set with the tubing in tension, hanging free, or in compression.

The retrievable packer is cup-type in design, which is not held in place against the squeeze pressure from below, but by the packer slips which are set up by upper and lower cones driven behind the slips. The authors refer to the drillable packer as "a commonly used packer which has been modified to allow the packer stringer to be full opening." It has only one packing element, and in addition, a latch-on device which prevents the stringer from being forced out by high squeeze pressures.

Future projects . . . Huber and Tausch noted that the success of the Humble permanent-type completion procedure warrants development of other new equipment for handling wells completed by this method.

They spoke of research being done on accessory artificial - lift devices to provide suitable valves for "through-the-tubing operations," asserting that "with present-day gas-lift equipment, valve and mandrel failure necessitates occasional removal of the tubing."

They also mentioned work in progress intended to make possible the practice of squeezing cement through old production perforations to exclude excessive gas or water production and then reperforating using the permanent-type well completion.

This, they feel, will require development of a means of varying the position of the tubing extension while maintaining a seal between the tubing and the tubing extension.

Progress in Logging

Microlaterolog will speed interpretation of logging data by cutting need for empirical correlations, A.I.M.E. told

HOUSTON. — The newly developed Microlaterolog will make possible faster and simpler interpretation of logging data.

It will accomplish this, the American Institute of Mining and Metallurgical Engineers was told here, by minimizing the need for empirical correlations.

In the Microlaterolog paper, one of five on various phases of logging, H. G. Doll, director of research for Schlumberger Well Surveying Corp., said the new device gives the resistivity of the invaded zone directly. Exceptions may occur when the mud cake in the well bore is very thick, but these may be corrected easily.

It is used, Doll said, to obtain a resistivity log where the resistivity data as a function of well depth are easily correlated to basic formation properties.

Direct measurement of the resistivity of the invaded zone is achieved by positioning the electrodes in close contact with the wall of the well bore and by instrumenting so that "a beam of current of very small diameter is focused horizontally into the formation," Doll said.

Microlaterolog data should be useful for evaluating fluid saturation and reservoir porosity, he said.

Another paper concerning porosity was presented by C. B. Scotty and E. F. Egan of The Texas Co. These authors recalled how the neutron-gamma log of late has been used to indicate the presence or absence of porosity, even though it was originally developed for stratigraphic correlations.

The substance of their work was to show how by empirical means the relationship between porosity and neutron-gamma deflection can be predicted when the bore-hole diameter is known.

They suggested that similar correlations might be worked out for cases where the bore-hole is cased.

Formation factor . . . Results of a study on formation factors of unconsolidated sands were revealed by M. R. J. Wyllie and A. R. Gregory, of Gulf Research & Development Co.

In particular, they treated the influence of particle shape and the effect of cementation on the relationship between formation factor and parameters such as porosity and sphericity.

The fact that formation factor (viz. the ratio of the reservoir resistivity saturated with a conducting fluid to the resistivity of that fluid) is required in all schemes of resistivity-log interpretation, was used by Wyllie and Gregory to explain why they undertook such a basic and laborious study. Formation factors, they said, are more easily measured than are their basic components understood.

While the laboratory technique employed was direct, the authors were quick to point to the need for further refinements. They endorsed the straightforward but time-consuming technique of packing spheres, cubes, prisms and beach sand to simulate simple forms of isotropic porous media which would have widely ranging values of porosity and sphericity.

The less straightforward but easier technique of providing for a certain degree of cementation in the packings left much to be desired, they said.

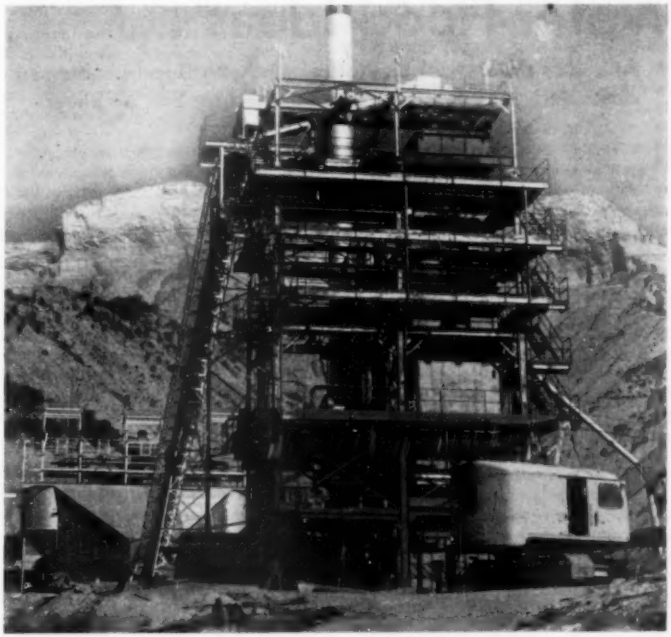
The importance of perfecting the preparation of porous media where degree of cementation can be varied arises from the desire to back up an interpretation of existing data. This interpretation is that the formation factor of consolidated media can be related in a definite way to the properties of the unconsolidated media which existed prior to cementation. The Gulf authors suggested this may be a key to some of the baffling questions of underground-reservoir origin and character. This will be checked by additional research.

Self-potential phenomena . . . The electric potential observed in wells is usually the algebraic sum of phase-boundary potentials and diffusion potentials, according to McCardell, Winsauer, and Williams of Humble Oil & Refining Co.

The largest part of the phase-boundary potential, they asserted, occurs at the shale-drilling fluid boundary.

Methods currently used for estimating salinity of interstitial water from the potential curve may give erroneous results and should be used with caution.

Equations have been derived, they



Shale Retort Using New Process Completed

Construction was completed last week on this demonstration-scale retort which will employ a relatively new process for continuous extraction of oil from shale. A series of dry-run tests will be made before the new retort is fired and placed in operation about the first of the year. The retort was built for the Bureau of Mines at Rifle, Colo., by Blaw-Knox Construction Co. Boyd Guthrie, chief of the bureau's oil-shale demonstration branch, said major objectives of the new plant will be to determine cost and yield data, provide technical design information for the industry, and to supply crude shale oil in quantities needed for the bureau's refining studies.

said, describing in a quantitative way phase-boundary and diffusion potentials which seem to explain satisfactorily the self-potential phenomena in oil wells.

Laboratory study . . . C. F. Rust of Magnolia Petroleum Co. told of extensive laboratory work he has undertaken to compare two methods of making resistivity measurements on small core samples.

The importance of this work, he said, lies in the fact that resistivities are often measured on rock samples from cored wells as an aid to electric-logging interpretation. In particular, he mentioned the need to have reliable methods for measuring formation factors and resistivity indexes on small core samples.

The Magnolia scientist declared that basically there are two different circuits which can be employed for resistivity measurements. One utilizes two electrodes placed at each end of the core sample—the two-electrode method—and one uses an additional two electrodes placed at intermediate positions—the four-electrode method. In substance, Rust said he wanted to find out once and for all if these two methods yielded the same data.

For this purpose, resistivity equipment which could be used to obtain data either by the two-electrode or the four-electrode method was designed. He asserted, "It is unquestionably helpful to use both methods on the same sample in order to check one measurement against the other." This is particularly so when resistivity index was being studied, he added.

"Provided proper techniques are employed, either the two-electrode or four-electrode method will yield reliable resistivity data," he said. This he proved by making reference to data obtained on 60 core samples. Another conclusion was that in evaluating saturations from measurements of resistivity indexes the same relationship between saturation and resistivity index hold regardless of whether the fluids saturating the core sample are in a condition of stable equilibrium.

Water-Flood Ideas

Atlantic's theoretical method of studying flood problems described; pilot-flood project outlined by Sun engineers

HOUSTON.—A theoretical approach and a practical approach to the problems of water flooding were presented in two separate papers before the A.I.M.E. Petroleum Branch meeting.

In one, results of laboratory experiments showed what conditions should be imposed to increase the sweepout-pattern efficiency of a five-spot water flood. In the other, the step-by-step process of starting with a pilot water flood and progressing to a full-scale flood as performance experience is gained was illustrated by describing the development of North Government Wells field of Duval County, Texas.

R. L. Slobod and B. H. Caudle of Atlantic Refining Co. described the theory and practice of their newly developed technique for studying areal sweepout efficiency in flooding operations

They described their laboratory technique as an "X-ray shadowgraph" method. It employs a test plate to represent the portion of the reservoir being studied, saturated with one fluid to represent the reservoir fluids. A second fluid to which an X-ray tracer is added is then used to displace the first in a manner simulating a flooding operation.

A series of X-ray photographs made as the flooding proceeds then gives the position of the flood interface as a function of time, from which the sweepout efficiency can be calculated by standard means, Slobod and Caudle declared.

The advantage claimed for their method was the ease with which flooding problems could be studied under conditions of different mobility ratio. This factor compares the conductivity afforded by the reservoir to the flow of the displacing phase on one hand, and the displaced phase on the other. The Atlantic scientists pointed out that previous methods of study, such as the electrolytic and potentiometric models, have been limited in this respect.

Results show the great dependence of sweepout-pattern efficiency (percentage of the reservoir entered by the flooding fluid) on the mobility ratio, the authors reported. Variations of as much as 50 per cent were noted for both the five-spot and straight-line spacing patterns.

They also presented data suggesting that at certain mobility ratios there is a 100 per cent sweepout efficiency in the five-spot flood.

Waterflooding in practice . . . D. M. Collingswood and R. J. Bethancourt of Sun Oil Co. told the A.I.M.E. audience about the water-flooding experience on one lease in North Government Wells field.

This lease, which is slightly larger than 3,000 acres, has seven producing zones at depths ranging from 700 to 7,500 ft. Only the North Government Wells sand at 2,250 ft. in the Jackson group has been flooded.

Lacking data to fully evaluate water-flooding potentialities, the operators started with a pilot water flood, later enlarging it on the basis of favorable results obtained.

The Sun engineers reported that to date the cost of this project has been in excess of $62,000, or about 2.8 cents per barrel of injected water. These costs do not include lease acquisition, or supervision.

While no exact estimate was made on the additional oil which the water flood has recovered during the several years of its operation, the authors showed by chart that the production decline was noticeably arrested shortly after the flood was initiated. They estimated roughly that a little more than 100,000 bbl. of additional oil had been recovered in about 4 years, compared with almost 2,000,000 bbl. of injected water during the same period.

"Greater water-flood efficiency would probably have been obtained by setting up as complete a coverage of five-spots as possible before initiation of injection into input wells simultaneously," they said, but this was not possible, they added, because of inability to obtain cross-line flooding agreements with offset operators.

Other water-flooding papers . . . Two other aspects of water flooding were treated by Halliburton Oil Well Cementing Co. and Carter Oil Co. authors. Bliss Adamson and Bob Diggs Brown of Halliburton described ways to measure the water-input profile in injection wells. L. A. Rapoport and W. J. Leas of Carter discussed the theory of linear water floods.

Adamson and Brown said a knowledge of the water-input profile (where the water goes into the formation in input wells) is important because of the existence of thief formations which divert the flood water from where it is wanted. They also explained that obtaining an input profile is a good way to see if the input well has been properly completed.

They showed that the so-called interface-velocity procedure for input profile determination, coupled with the use of caliper and correlation logs, gives satisfactory input-profile data. The authors explained that the interface-velocity procedure "consists of establishing an interface between two

fluids of different electrical characteristics."

By following the movement of this interface up and down the well bore of the injection well, as can be done for example by use of a shielded electrode, fluid velocity versus depth data can be obtained, they said. A caliper log is needed because the quantitative interpretation of the data requires a knowledge of the variation in bore-hole diameter, the Halliburton engineers concluded.

Rapoport and Leas of Carter discussed the theory of linear water floods and found that their reported laboratory data with small core samples were in agreement with this theory. They felt it now possible to determine the "factors which govern horizontal, linear field floods and to define a procedure for evaluating the water-flooding susceptibility of a given reservoir by laboratory tests."

While this is especially easy they declared in cases where the core sample and the reservoir it represents have profounded preferential wettability, it is also possible to accomplish in other cases.

Producibility Guide

Curves plotting annual against cumulative output of many declining gas pools can indicate performance of new ones

F. Lawrence Resen

HOUSTON.—Plotted curves based on production histories of numerous fields in their declining years may be used to appraise producibility of other, newer reservoirs.

Results of a study of production data on 49 gas reservoirs were revealed at the fall meeting of the American Institute of Mining and Metallurgical Engineers by Ralph E. Davis, Houston consultant, and Lee Hillard Meltzer, Union Producing Co., Shreveport.

From the research was formulated an average relationship between the reserves of a field and its capacity to produce during the late stages of its life.

For purposes of the study, it was necessary to know only the annual production and initial reserves in place, with production figures based on metered output. In all but two instances reserve estimates were based on pressure-decline curves.

Curves were constructed for each reservoir. These related annual production with cumulative production, with both figures expressed as per cent of initial reserve in place. This revealed that, for many reservoirs, annual-production figures carried throughout the lives of the pools give little indication of ability to produce since the output is directly affected by market conditions.

Thus, it is not until the declining years of the reservoir that annual production can be used as a measure of the field's capacity to deliver gas into a line, the authors said.

Among some of the more important factors which may be considered to influence developed field capacity directly or indirectly, they said, are: (1) size of the field, (2) individual well capacity, (3) depth to the producing horizon, (4) and the broad economic environment in which field development took place. Analyses of the influence of these factors on the reservoirs were presented.

Location not important . . . The general similarity of the curves plotted for the 49 reservoirs suggest, they said, that the observed relationships are largely independent of geographic distribution of the reservoirs.

From this data, the authors think that the curves present a possible solution to the problem of estimating a pool's future gas-delivery capacity. The predicting method is based on past experience. As such, they said, it assumes that the interplay of economic forces in the future will continue as in the past.

Since the individual reservoir may vary considerably from the mean, the method is applicable only when a substantial number of histories is used as a base.

Oil Price Lagging

It's still at a 1903 level compared with other items

HOUSTON.—Since the early days of the oil industry, wages have climbed higher and higher while crude-oil prices have only crept upward, Richard J. Gonzalez, director and economist of Humble Oil & Refining Co., told the petroleum branch of the American Institute of Mining and Metallurgical Engineers here.

This trend has continued, he said, in the face of increasing difficulty of finding and producing oil.

Relatively little evidence can be found in the past 40 years of any upward trend in the real price of crude oil, when measured in terms of wholesale prices of all commodities. In these constant terms, the price of crude oil in 1952 is about the same as it was in 1938 and 1924, as well as 1903, he said.

Based on constant-value dollars, the price currently is substantially less than in such prior years as 1948-50, 1925-26, and 1920-22, he declared.

The industry has been able to survive such a trend, Gonzalez said, because of its concentration on improved technology.

In 1913, he said, an average wage earner engaged in manufacturing had to work 3⅓ hours to be able to buy a barrel of crude oil. By 1928 he had to work only 2 hours, and in 1941, 1947, and 1952, only 1½ hours—less than in any prior year of unregulated prices except for the depression years of 1931 and 1933.

For products, the change is even greater. The wage earner had to work 5 hours in 1919 to buy 10 gallons of gasoline, before taxes. At present, he can get the same amount for the pay of less than 1¼ hours of work.

Several factors now are working against this trend, he said. These include: More intensive and expensive search for oil, discovery of fewer large fields, greater average depth of wells, an increasing proportion of deep wells which are particularly expensive, and the apparent tendency toward a lower reserve per acre in new discoveries.

Foreign Problems

Levy outlines difficulties of firms operating abroad

HOUSTON.—The pressures and obstacles facing American oil companies abroad are so great that no one should have been surprised had companies never ventured into the field of foreign oil, Walter J. Levy told those attending the meeting of the Petroleum Branch of the American Institute of Mining and Metallurgical Engineers here.

Levy, New York consultant, illustrated the diverse pressures by following the course of an oil transaction from a producing field in the Middle East to a market in Western Europe or the United States. In this well-head to consumer move, he said:

1. The producing country would like to obtain the maximum income from its oil. It would prefer to have the oil refined locally. It would like to receive payment in hard currencies. It

would be interested in the destination of its exports for political or commercial reasons.

2. The countries through which the oil will pass by pipe line from the Persian Gulf to the Mediterranean would ask for maximum income from the pipe-line operators. They would want their oil needs met at favorable terms. They may seek some control over destination of exports for political reasons.

3. The importing countries would like to obtain the oil at the cheapest possible price. They would prefer to receive it as crude rather than finished products. In many cases they would like to pay for most of the crude in soft currency. For security reasons they would want to receive crude from several sources.

4. The parent country of the operating company would insist that all operations be in accord with the laws and policies of the country.

5. The operating company must be concerned with the problem of fitting the production in one country into its over-all program. Also, it must consider safety of investment, return on investment, freedom of management, and protection against changes in operating conditions.

Levy pointed out that the free world depends increasingly on oil produced outside this country, particularly on oil from the Middle East.

He suggested that the countries of the Western Hemisphere could work out a plan of voluntary cooperation in solving the problems of conservation as well as supply and demand.

More Rigs Needed

PAD program for 1953 will require purchase of additional rigs, Thompson tells contractors; Whaley lauds A.A.O.D.C.

Kenneth B. Barnes

OKLAHOMA CITY. — Drilling contractors fundamentally are managers of big hole-making factories.

This concept of the drilling contractor's role was described by two of the principal speakers at the twelfth annual meeting of the American Association of Oilwell Drilling Contractors here September 29-30.

One was A. W. Thompson, who was completing his second successive term as A.A.O.D.C. president. The other was W. C. Whaley, president of Sunray Oil Corp., whose company has a lot of holes cut each year by drilling contractors.

Whaley paid tribute to A.A.O.D.C.'s work particularly for its educational programs.

"Your A.A.O.D.C. management institutes, your drill-pipe research program, your safety clinics, your mud and engine schools, your rig-floor training of crews, and the other teaching and training activities in which you are now engaged have all accrued to your benefit, both in increased efficiency and economy in your own companies and in increased service to your customers."

Whaley said also that contractors' employes now are better workers because the educational programs have given them a better understanding of operating details. Rigs are safer because of the safety clinics, he said, and mud and engine schools have taught crew members how to handle mud and care for equipment. Rig-floor training, he added, has made employes more conscious of their job responsibilities.

F. W. BRIGANCE . . . New A.A.O.D.C. president.

Future rig needs . . . Thompson, who is president of Thompson-Carr, Inc., Houston, outlined progress in drilling equipment.

Citing the efficiency of present "hole-making factories," he said the advances are immediately evident by comparing the 69½-ft. Drake well with two modern wells which reached below 20,000 ft., or by comparing the 36-in.-a-day drilling rate achieved by "Uncle Billy" Smith with the more than 1,500 ft. a day easily reached by many rigs of today.

To illustrate the importance of the drilling contractor's role, Thompson pointed to 1951 when nearly all drilling records were shattered. "Taking 91 per cent of the total footage drilled, which is the amount drilled by the contractors, and assuming a rate of $6 per foot, the dollar volume of our industry during 1951 totaled $949 million—almost a billion dollars a year."

Thompson said the drilling program outlined by the Petroleum Administration for Defense will require 354 more rigs in 1953 than were operating in 1951, involving an expenditure of at least $94,000,000.

"This drilling blueprint calls for 55,000 wells in 1953, 60,000 in 1954, and 65,000 in 1955," Thompson said.

"In 1951 an average of 2,950 rotary rigs were operated each month. They drilled 156,835,000 ft. of hole. That is the equivalent of 53,000 ft. of hole per rig. Projecting this figure onto a 55,000-well basis, we find it would require 3,305 rotary rigs to complete the program—354 more than the drilling industry was able to operate in 1951. The drilling of 55,000 wells on a basis of 3,900 ft. per well would require 214,500,000 ft. of hole."

Thompson arrived at his minimum-cost figure on the basis of $367,000 for each complete rig with a depth range of only 6,000 to 8,000 ft. This, he said, is the average cost this year.

Exploration's future . . . Frank A. Morgan, vice president of Richfield Oil Corp., Los Angeles, told the contractors that actual drilling should and will be used more and more in exploratory work.

Referring to the drill as the "greatest single tool of the exploration geologist," the former president of the American Association of Petroleum Geologists said he visualized more extensive geological test drilling by geologists with the aim of solving subsurface geological problems or completing geological surveys in relation to oil and gas possibilities.

"In the future such survey holes, even though they be 12,000 or 15,000 ft. in depth, should be considered as primary geological exploration holes, just as the seismograph is an exploration tool." On many occasions, he said, the decision as to whether to drill conventional test wells should await completion of a composite subsurface survey implemented by a liberal number of geological survey holes.

"This means a new and important concept in relation to exploration and drilling costs," Morgan said. But it is possible, he added, that with all personnel concerned working together intensively to get the most subsurface information for the least money "a

new type of result can be accomplished."

To illustrate present costs, he said an exploration seismograph shot-hole truck can drill core holes to 1,600 ft. for less than $2 a foot. When a conventional rig under contract covering everything is moved alongside to drill a test well to 1,600 ft. "the cost jumps to $4 per foot, dry-hole basis."

This example, Morgan said, suggests at least that oil-company personnel might be able to put all their heads together and come up with improved methods for various types of job.

Total exploratory costs in California since the war, Morgan said, probably have averaged $45 per foot of test-well drilling. Actual drilling costs probably have averaged $15 to $20 per foot, but the cost of geophysical work, lease purchase, rental, and land and geological work has averaged from $25 to $30 per foot. The cost of the actual test-well drilling has included many of those notorious "bad holes," he said, which have cost over a half million dollars, or more than $50 per foot.

"If this new survey drilling which I am talking about can eliminate the bad holes—and this must be done—and be reduced substantially in cost per foot, then we might double our exploration footage and thus broaden our subsurface geology without increasing exploration costs more than 15 to 20 per cent."

New officers . . . F. W. Brigance, vice president and manager of Rowan Drilling Co., Fort Worth, was elected president of the A.A.O.D.C. to succeed A. W. Thompson. C. F. Whaley, Chet Whaley Drilling & Well Servicing Co., Houston, was elected vice president at large to succeed Joe Dunbar.

New area vice presidents elected were J. W. Hall, Trinity Drilling Co., Midland, Tex., vice president for West Texas and New Mexico; John B. Holmes, Houston, for the Gulf Coast; John M. Grant, Loffland Brothers Co., Los Angeles, for California; Stewart G. Noah, Noah Drilling Co., Albion, Ill., for Illinois basin and Michigan; and Walter Tschudin, Pioneer Drilling Co., Inc., Casper, for the Rocky Mountain area.

Hold-over vice presidents include Earle C. Flesher, Johnson & Flesher, Oklahoma City, for the central Mid-Continent; H. M. McClure, Jr., McClure Drilling Co., Alma, Mich., for the cable-tool industry; N. H. Wheless, Jr., Wheless Drilling Co., for Cretaceous and Tertiary basins; and H. H. Hillman, California Production Service, Inc., Long Beach, for well servicing.

Brad Mills, Dallas, was reelected executive vice president.

Engineers Meet

Sinclair holding symposium on refinery maintenance

CHICAGO.—Between 75 and 100 plant supervisors and engineers with Sinclair Refining Co. this week will attend a 4-day maintenance and engineering symposium at the company's East Chicago refinery.

The current session is the latest of a series of annual interrefinery conferences established by Sinclair after the war. This year attention is directed exclusively to all phases of refinery maintenance.

Morning sessions will be given mainly to presenting some 25 papers on such maintenance subjects as organization and procedure, safety, training, turnarounds, record and reports, costs, shops and stores, use of inhibitors, still-tube burning, exchanger fouling and tube bundle life, cathodic protection, economics of spares, and use of motorized equipment. Numerous minor reports are also being made on individual refinery practices and specialized equipment.

During the afternoons inspection trips are scheduled for East Chicago refinery and Sinclair research laboratories at nearby Harvey. The remainder of the afternoon sessions will be reserved for question-and-answer periods and discussions of papers.

Sinclair engineers from all seven of the company's refineries, the New York office and Harvey, plus representatives of Richfield Oil Corp.'s Los Angeles refinery will take part in the program.

W. S. Gullette, assistant chief engineer in charge of Sinclair's central engineering department, East Chicago, is chairman of this year's meeting.

Job-Turnover Rate Lamented

HOUSTON. — Indiscriminate job-shifting on the part of geologists poses a danger-from-within to the profession according to Morgan Davis, president of the American Association of Petroleum Geologists.

The very nature of a geologist's work requires him to possess much confidential information, and to have him passing from company to company with such knowledge causes grave concern among industry heads, Davis, who is a vice president of Humble Oil & Refining Co., told the Houston Geological Society.

He made the point that the geologist should not refrain from using his freedom of opportunity, but at the same time said he did not think the 50 per cent turnover in jobs in some oil regions was reasonable.

The practice of training young geologists just out of college only to have them change jobs at the first opportunity is making some companies weary and irritated, he said. However, not only the younger men, but also some of the older ones were shifting to other jobs at an increasing rate.

Davis offered no solution to the problem, but felt that it was a good time to bring his fears out into the open.

Kansas Making Up Deficit

WICHITA.—Kansas expects to make up its strike-induced deficit in oil production this month.

The state's October allowable is set at 330,000 bbl. daily, not including condensate. This is on a par with last month's record-shattering figure.

Jeff Robertson, chairman of the Kansas Corporation Commission, said totals are fixed at 320,000 bbl. daily for current production and that 10,000 bbl. more per day will be permitted for strike make-up.

SOUTHWEST

Texas Eyes Records

Activity running ahead of 1951; steel holds answer

AUSTIN, Tex.—Barring any additional shortages of steel, Texas oil operators will set an all-time drilling record this year, according to figures of the Texas Railroad Commission.

Although the industry has been beset by steel shortages resulting from defense activities as well as the steel strike, oil and gas well completions and wildcat operations are running well ahead of last year, when the present record was set.

Oil-well completions in proven fields for the first 8 months of 1952 totaled 7,553, as opposed to 7,256 in the same period last year. Gas-well completions are up to a 605 total, compared to a 562 total in 1951.

Matching pace are the dry holes, which have increased to 4,414 compared to last year's 3,868.

At the end of the first 8 months of 1951, wildcatting activity had resulted in completion of 370 oil wells, 100 gas wells, and 2,166 dry holes. At the end of August this year, wildcats had recorded 427 oil wells, 40 gas wells, and 2,589 dry holes.

Steel availability in the last quarter will determine whether total completions in 1952 will exceed those of 1951, according to E. M. Dutton, the commission's director of production.

OFFICIALLY ON STREAM is Ontario's newest refinery, the 20,000-bbl., $23,000,000 plant of Canadian Oil Companies, Ltd., at Sarnia. The refinery, shown here at night, was formally opened in ceremonies September 25, although it had been in operation some time. First unit in fact, began operation last spring. The refinery processes Redwater field crude oil.

New Refinery Opened

Canadian officials tour plant in all-day ceremony; Frost calls for gas line from Alberta to supply Ontario needs

George Weber

SARNIA, Ont.—More than 1,500 guests, including industrial and government leaders from throughout the Dominion, visited Canada's most modern refinery in an all-day ceremony here recently.

It was exclusively a Canadian show. The 20,000-bbl. per day refinery, built by Canadian Oil Cos., Ltd., and owned 99 per cent by Canadians, processes Alberta crude for a domestic market *(The Oil and Gas Journal, September 22, page 98)*.

Featured guest was Clarence D. Howe, who is Canada's minister of defense production and of trade and commerce. Oil developments of the past 5 years, he said, by drastically reducing crude and product imports from the United States, are one of the prime reasons why the Canadian dollar is the strongest currency in the world today.

Howe visualized the day, not many years distant, when Canadian oil will be in balance with domestic demand as contrasted with present-day production, which equals about one-third of total consumption. Introduced by W. Harold Rea, president of Canadian Oil Companies, Ltd., Howe shared the program with premiers of two Canadian provinces.

Bid for Alberta gas . . . Ontario's Premier Leslie Frost strongly advocated an eastward pipe line for Alberta's exportable natural gas. He said that Ontario already has developed a big potential market for natural gas and wants to do business with Alberta producers.

He cited 500 industries and 400,000 individuals now consuming natural and manufactured gas in the province and said demand has far outstripped the supply.

"This market is here with all of the pipe-line facilities and apparatus. It just awaits Canadian enterprise which will build an all-Canadian gas pipe line from west to east, servicing the prairie cities and communities, the lake-head cities of Fort William and Fort Arthur, Sault Ste. Marie, Sudbury and North Bay, and then this great developed market here in southern Ontario."

Howe, the man who, by means of granting steel priorities, will give the green light for pipe lines extending either east or west, had nothing to say at the time.

Although he is believed to have discussed the gas pipe-line question with both Premier Frost and Premier E. C. Manning of Alberta (who stated that his province now had an exportable surplus), no indication of his leanings was given at the ceremony.

Difference of opinion . . . Despite the attraction of an all-Canadian line for national reasons, Canadians themselves are not agreed on the direction which Alberta gas should take. Economically, some say that the eastern line, which would cost an estimated $250 to $350 million, is too costly both in steel and money. They argue that the shorter route to the West Coast, including the ready market in the United States Pacific Northwest, would net greater returns to Alberta producers. They propose export to the United States in the West and import from the United States Southwest in Eastern Canada.

Fundamentally, there still remains a doubt concerning the assurance of a steady, uninterrupted supply of United States gas to the east. The possibility that future United States demand for gas in the east might prevent Ontario from obtaining sufficient fuel, looms large in arguments for keeping Canadian gas inside her borders. This injects a political angle, which some observers in that country believe may have some bearing on future decisions.

Reserves . . . Alberta's premier, E. C. Manning, the third honor guest at the celebration, stated that, with natural gas reserves conservatively estimated at 7 trillion cubic feet, Alberta now has

an excess over local needs available for export outside the province.

He credited the new refinery with improving Alberta's crude market by consuming one-tenth of all oil now produced in that province.

Reef Area Promising

Canadians optimistic over prospects of trend lying south of Leduc; reserves considered at least 100,000,000 bbl.

Henry D. Ralph

CALGARY, Alta. — The hottest oil play in Alberta at the moment is along a chain of Devonian reefs extending south of Leduc field to the vicinity of Pigeon Lake, 30 to 45 miles southwest of Edmonton.

These chimney-type reefs are narrow but thick, small in areal extent but with accumulations of oil and gas several hundred feet thick. In some places the reef is water loaded, and it is not yet known whether the formation is a chain of separate reefs or a series of buildups on one long reef.

The present rate of drilling activity in the area should give the answer soon, and also permit rather definite estimates of the recoverable reserves.

How many reefs . . . Some operators believe that there are at least two or three separate reefs, each of which will develop into a major field with reserves of 100,000,000 bbl. or more. Even the least optimistic are certain that the group of reef highs together will prove up reserves totaling well in excess of 100,000,000 bbl.

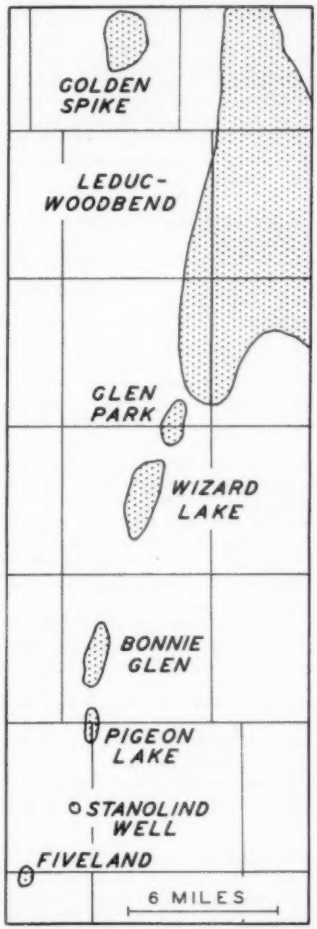
During the past year or so rich strikes have been found in five places along a 20-mile stretch, with only one disappointing surprise—a reef pinnacle largely full of water. The productive areas of these reefs are only three or four locations wide, but the pay zone is exceptionally thick in places. Close to 700 ft. of oil and gas column has been logged, compared with an average of 38 ft. of pay thickness in the Leduc reef and 200 ft. in Redwater.

The tops of these reefs lie 6,500 to 7,000 ft. below the surface at about —3,900 ft. subsea. The crude has a gravity of 38° to 40° A.P.I., and the wet gas is rich in condensate. The wells have a high producing potential, which is currently held down by market proration, but they are being put on production as fast as completed because of their nearness to gathering pipe lines running into Edmonton.

The reefs are in the D3 zone, but the D2 zone usually is productive just above them. Some of the wells have also found commercial pay in the Viking sand on the way down, but the D3 reef oil is the prize objective.

The play in the Pigeon Lake area began a year ago, and at present the productive localities are known by five different field names: Glen Park, Wizard Lake, Bonnie Glen, Pigeon Lake, and Fiveland.

Glen Park . . . British American Oil Co., Ltd., brought in the Glen Park pool last year a couple of miles southwest of the end of production in Leduc field.



TREND of reef discoveries south of Leduc field.

It proved to be a pinnacle reef, much like Golden Spike 15 miles to the north. It is small but rich, with a pay thickness at the peak of 400 ft., including a 35-ft. gas cap, and there is 35 ft. of D2 pay above. Glen Park now has eight producing wells and two drilling. It produced an average of 698 bbl. per day in June.

Wizard Lake . . . The Glen Park strike was followed up late last year with the discovery by Texaco Exploration Co. at Wizard Lake, about 2 miles south of Glen Park.

This is the richest find in the chain, for the reef here has a maximum oil thickness of 630 ft. and no gas cap. The field already has 23 producing wells and 3 drilling, on a spread of about 1,000 acres. During June, Wizard Lake produced an average of 5,800 bbl. of oil.

Bonnie Glen . . . Another 5 miles to the south, Texaco brought in Bonnie Glen field last January. At its highest point the reef here has 300 ft. of oil and nearly 400 ft. of wet gas. There are now 9 producing wells on this structure and 1 drilling, and in June the field produced an average of 752 bbl. per day.

Pigeon Lake . . . A third hit for Texaco was its Pigeon Lake well, 3 miles south of the nearest production in Bonnie Glen, which last month found 254 ft. of wet gas and 300 ft. of oil in the reef.

Since the gas-oil and water-oil contacts are at the same subsea levels as at Bonnie Glen, the two probably are the same reef, and this should soon be determined by wells now drilling.

Fiveland . . . The southernmost find to date is the Fiveland well of Canadian Gulf Oil Co., et al., about 9 miles from Bonnie Glen production. Last month it found a column of 250 ft. of wet gas and 240 ft. of oil in a D3 reef. Since the top of the D3 is 200 ft. lower than at Bonnie Glen, Fiveland probably is a separate buildup.

One failure . . . Enthusiasm for the future of this reef was running very high until about 2 weeks ago when it was dampened by the first drill-stem test in a well being drilled by Stanolind Oil & Gas Co., et al., midway between Texaco's Pigeon Lake and Gulf's Fiveland wells. Apparently this well found 140 ft. of wet gas with the water about 20 ft. below it, indicating the possibility of only a very thin oil zone.

Further testing is being done at this well and exploratory work is continu-

ing throughout the general area, but already enough oil has been proved up to make Pigeon Lake the outstanding oil area of the year in Alberta.

Crude Goes West

First prairie oil moved to Imperial's B.C. refinery

EDMONTON, Alta. — The first Canadian prairie crude oil destined for processing in a British Columbia refinery was shipped last week to the Pacific Coast from the Edmonton area.

California has been the normal source of crude supply for British Columbia. Since the Korean war began, however, California's exportable supplies have been shrinking, while the British Columbia demand has grown steadily.

A 27-tank car oil cargo will leave Nisku, 14 miles south of Edmonton, for the Imperial Oil, Ltd., refinery near Vancouver. The shipment totals about 5,400 bbl.

Interim arrangement . . . Similar rail shipments of Alberta oil will be made daily until completion next summer of the Trans Mountain pipe line, from Edmonton to Vancouver.

Imperial Oil arranged the temporary 810-mile rail movement of oil from Leduc field through the mountains to assure sufficient feed for its British Columbia refinery. Alberta will provide more than half the plant's daily crude requirements. The rest will continue to come from California.

When the Trans Mountain line goes into operation, Alberta will supply all of Imperial's crude-oil requirements in British Columbia. The refinery's capacity currently is being enlarged to 22,500 bbl. a day, and expansion should be completed simultaneously with the pipe line.

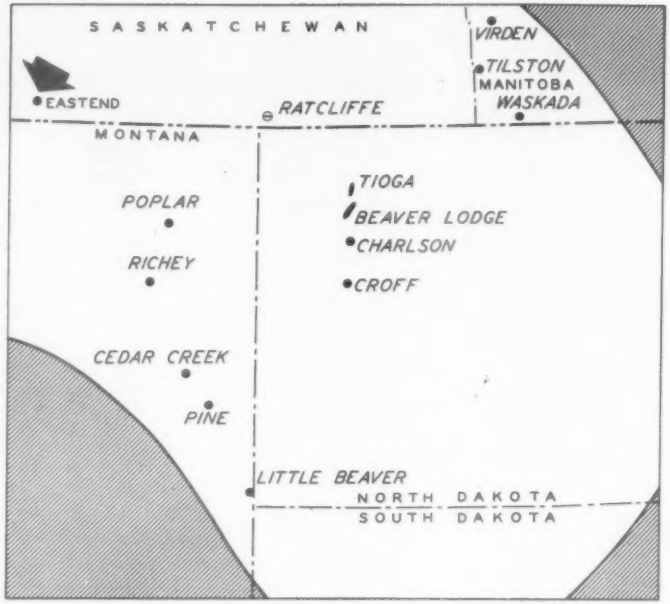
Edmonton Plant Studied

EDMONTON, Alta. — A natural-gasoline plant with a processing capacity of about 35,000,000 cu. ft. of gas daily is planned for the East Edmonton industrial area.

Preliminary studies now being carried out indicate the plant will cost $8,000,000 to $10,000,000 and will recover an estimated 45,000,000 gal. of propane and butane and 15,000,000 gal. of natural gasoline annually.

The studies were announced by Robert Campbell, engineering contractor and president of Barcam, Ltd., an Alberta incorporated firm. Campbell said the project would be financed by New York capital.

Natural gas would come from 11 fields in the Edmonton area.



THE WILLISTON BASIN as it looks today. Arrow indicates newest discovery.

Basin Discovery

Wildcat completed for 800 bbl. daily in Saskatchewan

REGINA.—An important new Williston basin discovery in Saskatchewan has been completed by Tide Water Associated Oil Co.

Announcement of the well's completion came as Manitoba operators disclosed that Williston basin pools in that province soon would double their small daily production with total output nearing 1,000 bbl.

The new Saskatchewan discovery is the 1 Eastend Crown, drilled by Tide Water as operator for itself and Atlantic Refining Co., Ohio Oil Co., and Columbian Carbon Co.

The well, after swabbing, flowed at a rate of 800 bbl. daily from Jurassic lime, the heaviest production indicated to date in any Saskatchewan well.

The important new Williston discovery is about 32 miles north of the United States boundary, 62 miles east of the Alberta line, and 10 miles southeast of Eastend. Plans already are prepared to drill additional wells in the area.

Manitoba production . . . Increased output in Manitoba will be made possible by completion of Interprovincial Pipe Line Co.'s facilities at the Cromer pumping station.

Tankage at Cromer is being installed to handle the crude, which can be moved eastward for ultimate delivery into the Winnipeg refining area or the Brandon area.

Until now the crude has been trucked to Northern Petroleum Corp.'s Kamsack refinery. Bad weather this summer delayed deliveries into Kamsack and cut production to about 250 bbl. daily. Upon completion of the Cromer facilities crude will be moved by truck to the pumping station.

Production was first found in Manitoba in February of last year. At present the province has three producing pools, Virden, Tilston, and Waskada.

Gas System Near Completion

EDMONTON, Alta.—A natural-gas gathering system under construction by Ajax Petroleums, Ltd., north of here is nearing completion.

The system will supply gas under a long-term contract to Canadian Chemical Co.'s multimillion dollar plant.

The system consists of 30 miles of gathering lines in the Morinville area northwest of Edmonton and a 20-mile line to the chemical plant. The plant is expected to be completed late this year, and initial deliveries of gas at about that time are expected to run about 30,000,000 to 35,000,000 cu. ft. of gas daily.

The system is being built at a cost of about $1,700,000.

Drive for Capacity

California industry will spend a staggering $200,000,000 by early 1954 for new refining and petrochem facilities

D. H. Stormont

LOS ANGELES.—The California petroleum industry will spend in excess of $200,000,000 in the next 1½ years for expansion and modernization of refining facilities and construction of new petrochemical plants.

About $139,000,000 will go for crude-oil distillation, catalytic cracking, and similar units. Approximately $66,000,000 is to be spent in the state's first large-scale construction of petrochemical plants.

Work now under way or announced for completion by early 1954 will result in the construction of approximately 275,000 bbl. of new distillation capacity. Consisting largely of vacuum units, about 175,000 bbl. of the new capacity will replace obsolete equipment. The remaining 100,000 bbl. will add to capacity and will increase crude-throughput of active California plants to approximately 1,200,000 bbl. daily.

Catalytic cracking facilities now being built or definitely scheduled for construction by early 1954 have a total daily capacity of 120,000 bbl. daily. Their completion will raise catalytic cracking capacity of California refineries to 320,000 bbl. daily.

These new refining facilities are being constructed in the Los Angeles and San Francisco plants of five of the West Coast's major oil companies.

Projects costing from $2,000,000 to $3,000,000 have been announced or certified for rapid amortization by the Petroleum Administration for Defense for the plants owned by Hancock Oil Co., Mohawk Petroleum Corp., Rothschild Oil Co., and Eureka Refining Corp. All, however, are more or less in a dormant stage.

Richfield Oil Corp. is getting under way on the largest project on the coast—one estimated to cost $40,000,000. Major facilities projected include a 35,000-bbl. fluid cracking plant, a 60,000-bbl. vacuum-distillation unit, a superfraction unit, and facilities for converting propylene into gasoline and for recovering ethylene.

The project will boost capacity of Richfield's Watson refinery 20,000 bbl. to a new total of 125,000 bbl. daily. Aviation-gasoline production capacity will be tripled to about 12,000 bbl. daily, and total gasoline output will be hiked approximately 40 per cent to around 66,000 bbl. daily.

Standard Oil Co. of California at El Segundo has a 10,000-bbl. Platformer and a new 23,000-bbl. feed-preparation unit nearing completion. A new 850-bbl. benzene and 3,200-bbl. toluene plant also is about to go on stream.

The company has announced that a 54,000-bbl. vacuum distillation unit and a 36,000-bbl. fluid cat cracker will be installed at Richmond. Involving an expenditure of $20,000,000, these will be started next spring.

Standard also is expanding alkane facilities 3,000 bbl. per day at its Richmond refinery and early next year will start a $4,000,000 phenol plant. The latter will utilize a recently developed synthesis process in which neither sulfuric acid nor chlorine is used.

Union Oil Co. has launched a $27,000,000 expansion program which will increase crude capacity of its Wilmington refinery 30,000 bbl., or to a daily throughput of 100,000 bbl. daily. Major units include a 38,500-bbl. vacuum-distillation unit, and two 20,000-bbl. topping units. A 28,500-bbl. fluid catalytic cracking unit recently was placed on stream. In addition to this work a 15,000-bbl. continuous coker is planned.

Shell Oil Co. late next year will complete a 52,000-bbl. crude-distillation unit at Wilmington boosting that plant's throughput 20,000 bbl. daily to a new total of 72,000 bbl.

General Petroleum Corp. is expected shortly to award contract for the construction of a 10,000-bbl., $9,000,000 Thermofor cat reforming unit at its Torrance refinery.

Petrochemical construction, in addition to that already mentioned, will be comprised largely of a $36,000,000 polyethylene and ethylene glycol plant. It is to be built by Carbide & Carbon Chemicals Co. at Torrance, adjacent to General Petroleum's refinery.

Near Tide Water Associated Oil Co.'s Avon refinery, Monsanto Chemical Co. has started construction of a phenol plant and by the end of the year will have in operation a new 250-ton sulfuric acid plant. Shell Chemical Co. is building a 150-ton anhydrous ammonia plant near Ventura, which will be completed by mid-1953.

Broad Theme for C.N.G.A.

LOS ANGELES.—Recent trends and developments in all divisions of the petroleum industry will be covered here during the annual fall meeting of the California Natural Gasoline Association October 9-10 at the Ambassador Hotel.

J. F. Lynch, of La Gloria Corp., Corpus Christi, will discuss developments in the natural-gasoline industry. Dr. Peter Koropoulos and Craig Marks, of California Institute of Technology, will outline those in automotive field; A. C. Rubel, Union Oil Co., production and drilling; David Day, Richfield Oil Corp., refining; J. H. Marshall, Signal Oil & Gas Co., business and government; and R. D. Gray, of Cal Tech, industrial relationships.

These addresses, along with "Why and Where Gas Fields Exist," by J. R. Pemberton, Los Angeles consulting geologist, all will be delivered October 10.

The preceding day's schedule will consist of concurrently held forums on compressors and engines, processing and design, testing, and field and plant lines.

Drilling Platform Trial Set

LONG BEACH.—Monterey Oil Co. is scheduled to stand trial before a jury October 10 because of its construction of a drilling platform 8,100 ft. off Seal Beach.

Monterey is charged by the city with erecting a structure within the city limits without first having obtained a city building permit and with construction of an apparatus for the purpose of drilling for oil.

Before the company began work on the platform, it obtained permits from the California Lands Commission, the U. S. Army Engineers, and the U. S. Department of Interior.

The city bases its charge on a 1939 city ordinance in which it extended its authority to regulate activities to cover the surface of the water extending 3 miles seaward.

Monterey pleaded not guilty to the charges in Seal Beach city court September 26 and asked for a jury trial. In the meantime, it planned to ask a higher court to issue a writ prohibiting Seal Beach city courts from proceeding with the case, holding that the city's ordinance is unconstitutional.

Crude Problem

Three groups ask different price increases to solve it

LOS ANGELES.—The three applications for upward adjustments in the prices of California crude and refined products pending before the Office of Price Stabilization all point to a scarcity of crude oil in California, but no one of them is in close agreement with the others. Each seeks a different remedy.

The recent filing of an application by Standard Oil Co. of California will not affect the efforts being made by a committee of independent producers, according to W. H. Geis, chairman of the group.

The independents' application was filed last April and asked for a 70-cent per barrel increase for crude below 10° gravity, with the raise declining to 3 cents per barrel for crude over 31°. A month earlier Union Oil Co. had asked for a 60-cent across-the-board increase in the price of crude oil and a compensating raise in product prices.

Little in common . . . In a report to the approximately 200 producers who joined in the independents' application, Geis said the committee had decided it would neither join nor oppose the other applications. Commenting on Standard's, Geis stated:

"There is little in common in a comparison of the independents' application with that of Standard, except that in both the conclusion is reached that a scarcity of oil exists in California and that an increase in price would help to increase the supply.

"The two applications apparently are prepared on entirely different bases. The independents' application seeks to correct situations existing in California crude-oil production, whereas the Standard's effort is not only, in accordance with its viewpoint, to correct a crude-supply condition, but to do so in accordance with the product market.

"However, it is quite apparent that if the Standard's schedule were approved and put into effect further violence would be done to the price relationship between crude oil gravities in California and, therefore, would make the situation far more aggravated than at present."

The flat increase asked by Union, which was turned down by OPS with the company reserving the right for a review, would not change the price relationship between gravities. These inequities, Geis said, "weigh principally upon the independent producer but depress the entire industry."

"Your committee fully supports the idea that all types of crude ceiling prices should be increased, but its application carries the implication that before a general increase occurs it is first necessary to restore the historical price relationship between gravities."

In his report Geis noted that the petroleum branch of OPS about August 1 recommended an adjustment in price ceilings on heavy crude, but said a subsequent report of the Petroleum Administration for Defense held that this alone would not alleviate the crude-oil scarcity in California and recommended an increase in all crude prices.

"Faced with the PAD report, the chief of the OPS petroleum branch advised that our application would have to be given further consideration," Geis said.

Injection Plant Contracted

LONG BEACH.—The Board of Harbor Commissioners has awarded a contract for construction of a pilot gas-injection plant to Oil Field Construction Co. The plant is to be built on Pier A.

The plant was proposed as a means of stopping subsidence in Wilmington field and of promoting secondary recovery. Completion of the plant is scheduled for next March 15. It will inject about 6,000,000 cu. ft. per day.

GULF COAST

Big Barge Rig on Location

HOUSTON.—Richardson and Bass, Fort Worth drilling contractors, have a new drilling barge on location in the Blind Pass area, 4 miles southeast of Rockport, which is designed to "handle any known or contemplated drilling job in the Gulf Coast region."

The power plant on the heavy-duty barge consists of five supercharged dual-fuel diesel engines supplying a total of 3,350 hp. The crown block and traveling block will safely handle a suspended load up to 540 tons, while the hook attached to the traveling block is of 450-ton capacity.

The barge is 190 ft. long, 54 ft. wide, and 12 ft. deep. The drilling slot is 89½-ft. long by 8 ft. wide. In addition to a fuel supply of 1,120 bbl. and a fresh-water capacity of 4,650 bbl., the barge has drilling-mud facilities sufficient for 750 bbl. active capacity and 1,500 bbl. reserve capacity.

The draw works is flush with the derrick floor, while the pumps and mud tanks are on the lower deck. The engines are mounted on a platform between the lower deck and the derrick floor.

The barge was built by Levingston Shipbuilding Co., Orange. All of the drilling equipment was furnished by National Supply Co.

Small Part of T.G.T.'s Expansion Program

Mechanics are shown here assembling a huge, 1,600-hp. compressor engine at Tennessee Gas Transmission Co.'s Station 4 at Jasper, Tex., before adding it to a battery of engines already installed. The Jasper station was one of 16 enlarged during the company's 1952 expansion program. In addition, four new stations were built. A total of 93,900 hp. was added to the system during the year. For details on T.G.T.'s 1952 expansion program and its plans for 1953, see page 162.

ROCKY MOUNTAIN

Injection Success

Engineers find answer to Elk Basin field puzzle

CODY, Wyo. — Gas-injection problems in Elk Basin field of Wyoming and Montana have been licked, and U. S. Geological Survey engineers now are confident that the present production of 20,000 bbl. of oil daily can be continued for many years.

They now think actual recovery will exceed the estimate of 230,000,000 bbl. made in 1947.

The field has produced oil from relatively shallow depths since 1915, but the major discovery was made in December 1942 when Minnelusa Oil Co.'s 1 Henderson produced 1,200 bbl. of oil in 12 hours from the Tensleep sandstone. There are now 128 active wells producing from the Embar-Tensleep formation with cumulative production through 1951 in excess of 43,000,000 bbl.

Because 63 per cent of the productive area of the reservoir is federal land, an agreement was entered into in 1946 with Stanolind Oil & Gas Co. as unit operator of the field under supervision of the Geological Survey.

Recovery headaches . . . In 1949, when it became apparent that gas injection would be necessary to maintain reservoir pressure, it was found that the gas produced with the oil was unusable, and no outside gas supply was available. The field gas contained approximately 13 per cent hydrogen sulfide and about 6 per cent carbon dioxide, the usually high concentration of hydrogen sulfide making it extremely poisonous.

Air injection was impractical, because the mixture of air and hydrogen sulfide would be highly corrosive. It was finally decided to burn the gas, thereby increasing its volume, and inject the inert combustion gases. This plan also made possible the production of elemental sulfur, natural gasoline, and liquefied petroleum gases as major byproducts.

Since injection began 3 years ago, the reservoir pressure has increased slightly, and injection volume now is exceeding withdrawal volume.

Rank Wildcat Finds Oil

BILLINGS, Mont.—George J. Greer made an important Tensleep sand discovery at his Nine Mile rank wildcat in Big Horn County and is running casing for completion.

The well, the 2 Kendrick, is on the west side of the Powder River basin and on the south side of the Bull Creek Syncline, 10 miles east of Hardin. Recovery on test from 4,556-88 ft. was 1,440 ft. of black, 20°-gravity oil.

This is the first discovery of oil production in this general area of central Montana, although some gas has been produced at Nine Mile since 1913. Closest oil production is in Soap Creek field, 45 miles southwest, where some Madison production is obtained.

Williston's Market

Crude will be used locally until 1965, Winger predicts

HOUSTON.—The local market will probably be able to absorb all of the Williston basin production, at least until 1965, according to a paper presented at the meeting of the Petroleum Branch of the American Institute of Mining and Metallurgical Engineers by John G. Winger, Petroleum Department of the Chase National Bank.

Winger suggested that as the productive capacity of Williston grows and is able to supply a greater part of the local demand, the supply sources now serving the areas will be replaced. This replaced material will be absorbed by the growing supply deficiency indicated for District 2.

The author's forecast of supply and demand for crude in District 2, excluding production in the Williston basin, shows a need for additional crude amounting to 60,000 bbl. daily in 1955, 210,000 bbl. daily in 1960, and 305,000 bbl. daily by 1965.

Demand from the local market, including North Dakota and portions of South Dakota, Montana, and Minnesota, is forecast at 200,000 bbl. daily in 1955, 260,000 bbl. daily in 1960, and 300,000 bbl. daily in 1960.

Market outlook . . . To evaluate the Williston market, Winger lists certain criteria for crude marketability.

To possess marketability, the reserves must be near major consuming areas or else have cheap transportation to such areas. If neither condition exists, the finding and lifting cost must be low or there must be a scarcity of supply.

Williston basin does not have access to low-cost water transportation nor does it have large consuming areas near at hand. Finding and development costs have not been sufficiently low to afford any particular advantage.

On the other hand, the productive capacity of District 2 will not be sufficient to continue supplying the present percentage of the district's crude requirements without Williston production, according to the author.

EASTERN

Producers Drop Price Fight

BRADFORD, Pa. — The Pennsylvania Oil Producers Committee apparently has given up its battle with the Office of Price Stabilization to get a higher ceiling price on Penn Grade crude.

This was revealed by J. P. Jones, secretary of the committee, who said the group has no plans for a future course of action since OPS formally rejected its proposed price hike.

Jones said the producers group had given the agency all the information it had and all that OPS had solicited. He said he felt that the agency believes the price plea is justified but apparently doesn't know how to "give us the relief."

The present ceiling price on Penn Grade crude is $4.25 per barrel—the same as in December 1950. Producers claim costs have risen 72 cents since 1948 to produce a barrel of crude from Bradford field. At the same time, they say, the posted price for crude in the field dropped 75 cents between 1948 and the date of the formal price freeze in January 1951.

OPS advised the group to present its claims to the Petroleum Administration for Defense.

"Harbor" Line Approved

NEW YORK.—Sinclair Pipe Line Co. has been granted certificates of necessity for the 110,000-bbl. 16-in. products line, which it plans to lay from Philadelphia to New York. The Defense Production Administration last week authorized rapid amortization of $1,899,000 of the $7,296,000 estimated cost of the line, while the Petroleum Administration for Defense authorized purchase of 14,894 tons of pipe for the line during the fourth quarter of this year.

Negotiations are now under way between Sinclair, Gulf Oil Corp., and The Texas Co. on the formation of Harbor Products Pipe Line Co. which will operate the line. No final agreement has yet been reached (The Oil and Gas Journal, August 25, page 179).

Cartel Case Opens

Companies ask court to dismiss grand jury, kill subpoena demanding records, transfer investigation to New York

WASHINGTON.—Arguments on oil-company motions against the Department of Justice's grand jury investigation of the industry were heard last week by Judge James R. Kirkland of the federal District Court.

The grand jury, which recessed after being empaneled last month, was scheduled to start its investigation October 3, and argument was heard by the court on the two preceding days.

Earlier in the week The Texas Co. asked the court to dismiss the jury and throw out the subpoena calling for the submission of records by the companies involved in the investigation. In its own case, the company said, the subpoena would require the examination of 20 million documents at a cost in excess of a million dollars.

In addition to motions to discharge the jury and revoke the subpoenas, the companies asked that the scope of the investigation be limited and that the proceedings be shifted to New York, where three suits have been filed for recovery of alleged overcharges on sales of Middle East oil to European Marshall Plan countries.

Move opposed . . . The Department of Justice vigorously opposed transfer of the grand jury proceedings to New York, for one reason because the court calendar there is badly clogged, but during the hearing of argument Judge Kirkland commented that the congestion was equally great in other jurisdictions.

Department attorneys also emphasized the international character of the investigation, pointing out that a number of friendly foreign nations with diplomatic representatives in Washington but not New York are interested, and said that as a courtesy to them the case should be handled in Washington.

In arguing for a change of venue, the companies strongly protested the makeup of the grand jury. Fourteen of its 23 members, they said, are government employes, 8 of them from agencies with a direct interest in the issues involved in the investigation.

The Government's case is being presented by a special Justice Department staff headed by Leonard Emmerglick, antitrust division attorney who successfully prosecuted antitrust charges against the Aluminum Co. of America.

Foreman of the jury is Frederick W. Butler, an auditor, and deputy foreman is Russell J. Barger, a transportation rate specialist for the Army.

More Steel Available

WASHINGTON. — An additional 25,000 tons of casing and tubing for delivery this year will be going to 157 oil and gas operators under third-quarter authorizations.

This tonnage will be in addition to the 354,000 tons of oil-country tubular goods originally authorized by the Petroleum Administration for Defense in allotments from regular mill production. The additional allotments given operators, however, will be deducted from their first-quarter 1953 authorizations.

The additional tonnage will come from the National Tube Division of the United States Steel Co., where output since the end of the steel strike has exceeded expectations. National Tube mills are expected to complete all orders they now hold for casing and tubing against third-quarter authorizations by December 10 and will turn out an additional 25,000 tons during the remainder of that month.

First PAD Order Revoked

WASHINGTON.—The first official order issued by the Petroleum Administration for Defense, restricting the use of tetraethyl lead in automotive gasoline, was revoked last week.

PAD Order No. 1 was issued in February 1951 to permit the building of a stockpile and to spread available supplies throughout the refining industry.

By April 1 of this year, PAD and the military agreed that an adequate stockpile had been accumulated and that supplies of raw materials were adequate to provide for the needs of expanded production facilities. Thereupon all restrictions on consumption were removed, but the reporting requirements were continued until the order was revoked September 30.

During the period of the order's operation, according to Deputy Administrator J. Ed Warren, enough new productive capacity was brought into operation to produce sufficient quantities of TEL to more than satisfy all military and civilian requirements, even in a period of all-out emergency.

Structural Steel Allocated

WASHINGTON.—An allotment of 60,000 tons of structural steel has been granted the Petroleum Administration for Defense by the Defense Production Administration for first-quarter construction activities of the oil and gas industries.

PAD's allotment is 19,425 tons less than it received for the third quarter of this year and 4,000 tons less than the allocation for the coming quarter. The cuts are in line with the 25 per cent curtailment from third-quarter allocations necessitated by the steel strike.

Structural-steel allotments are included in the carbon-steel totals made public earlier by DPA.

NATO Oil Group to Meet

WASHINGTON. — The North Atlantic Treaty Organization's petroleum planning committee will convene in Paris this week for its third meeting so far this year.

The committee, composed of representatives from each of the NATO countries, is concerned with the petroleum requirements of the associated nations in the event of war. It does not concern itself with any current international oil problems.

United States representative on the committee is J. E. Brantly, assistant deputy petroleum administrator for foreign operations. Oscar E. Bransky, chief of the Mutual Security Agency's petroleum section in Paris, is alternate representative.

Robert H. S. Eakens of the State Department petroleum policy staff, Charles Hedlund, director of the program division of the Petroleum Administration for Defense, and Col. G. H. Montgomery, of the Munitions Board, will attend the meeting as advisers.

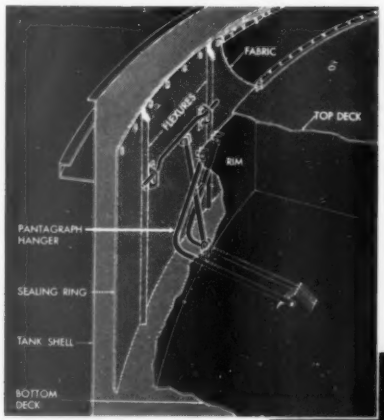
OPS Decision Appealed

WASHINGTON.—Independent producers are continuing their fight for decontrol of crude prices.

An appeal for a review of the decision of new Price Director Tighe Woods has been filed with Henry H. Fowler, director of Defence Mobilization, by the Independent Petroleum Association of America.

At the same time, Woods was asked

STOP EVAPORATION LOSSES From Floating Roof Tanks ... with the HORTON SEAL*



The deck of a floating roof covers a large percentage of the area of the tank. Double-Deck and Pontoon Floating Roofs also provide insulation over a portion or all of the liquid in the tank. The most important construction feature of a floating roof, however, is the device that closes the space between the deck and the tank shell.

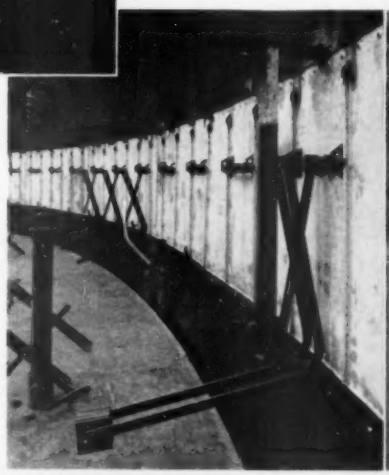
The real secret of Horton floating roof performance is the seal that so effectively closes the space between the deck of the roof and the shell of the tank. Three special features help insure its positive operation. They are: (1) The continuous sealing ring with vertical flexures every 22 inches of circumference that automatically follow the contour of the tank shell. (2) The pantagraph hangers that holds the sealing ring against the tank shell and keep the roof centered at all times. (3) The gastight, weatherproof, flexible fabric that closes the space between the deck of the roof and the top of the sealing ring making the space in the seal vaportight.

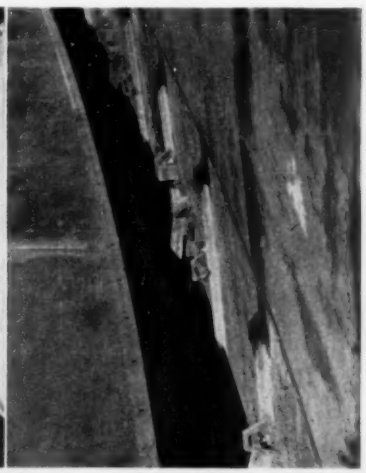
The Horton Seal is standard construction on all Horton Floating Roofs. Write our nearest office for more complete details.

Above: Diagrammatic drawing of a pantagraph hanger showing how it applies a gentle outward pressure against the sealing ring at all times.

Right: View of pantagraph hangers and sealing ring being assembled on an actual roof.

Far Right: View of hangers and sealing ring in place before fabric was installed.





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Birmingham, 1.....1536 North 50th St.
Boston, 10.....1025—201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Havana.....402 Abreu Bldg.
Houston, 2.....2119 C & I Life Bldg.
Los Angeles, 17.....1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3.. 1615—1700 Walnut Street Bldg.
San Francisco, 4.....1544—200 Bush St.
Seattle, 1.....1325 Henry Bldg.
Tulsa, 3.....1606 Hunt Bldg
Washington 6, D. C.....1139 Cafritz Bldg.

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Comprimo N.V., 21, Amstel, Amsterdam (C) Netherlands
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It is a cinch to save money and metal on line pipe jobs. There is no need to compromise—on pipe diameter or wall thickness—when it is so easy to match exact job requirements with Armco Welded Steel Pipe.

By actual count, you have a choice of 20 pipe diameters between 6" and 36", and 10 wall thicknesses between 9/64" and 1/2"—totaling 132 combinations.

But savings don't stop here. With the long 50-foot lengths of Armco Welded Steel Pipe, installation is easier and faster. And at less cost!

Longer pipe lengths mean fewer sections to haul and handle; fewer joints to make. But even here the assembly job is simplified with the specially prepared ends that speed field welding.

Use Armco Welded Steel Pipe with confidence for gathering systems, line pipe and wherever else you need dependable oil and gas lines. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 4432 Curtis Street, Middletown, Ohio.
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to reconsider the matter in the light of the recent increases in steel prices which will cost producers an average $8 per ton on their tubular goods and the fact that it has been necessary to eke out supplies by using the much more costly conversion pipe.

In his letter to Woods, IPAA's general counsel, Russell B. Brown, pointed out again that crude prices remain at the level established almost 5 years ago while wages, the cost of materials, and practically every other item contributing to the cost of producing oil have risen materially.

Brown told Woods that the association knows of no effort on Woods' part to obtain the views and information of the industry, either through an industry advisory committee or otherwise.

Major Product Exports Drop

WASHINGTON.—Exports of major petroleum products dropped to an average of 152,200 bbl. daily during the week ended September 5 from 249,000 bbl. daily in the preceding week, according to Petroleum Administration for Defense statistics.

With the exception of motor gasoline, in which a slight increase was noted, shipments of all products shared in the decline.

Details of the movement for the week, compared with the preceding week, and for the 4 weeks ended September 5 are shown in the accompanying table.

(Thousands of barrels daily)

	—Week ended—		Average
	Sept. 5	Aug. 29	4 weeks
Aviation gasoline	10.6	15.6	19.6
Motor gasoline	45.1	37.9	27.0
Kerosine		20.4	14.5
Distillate	69.2	124.4	85.2
Residual	27.3	50.7	40.6
Total	152.2	249.0	186.9

Strike Cut Gas Sales

WASHINGTON. — The steel strike and normal seasonal trends cut the marketed production of natural gas in the second quarter by 298,200,000 M.c.f. from the first-quarter level, according to a Bureau of Mines survey.

The bureau reported the second-quarter total marketed production as 1,853,800,000 M.c.f. against 2,152,000,000 M.c.f. in the preceding 3 months.

As a result of the downward trend, the industry made a net addition to storage of 100,900,000 M.c.f. In the first quarter it had withdrawn 95,400,000 M.c.f. from storage.

WATCHING WASHINGTON

Bertram F. Linz

Marketing A Target?

Amendment of the Clayton Act to make it unlawful for integrated units in the oil and other natural-resource industries to refuse arbitrarily to sell to responsible persons has been suggested to the Federal Trade Commission.

The springboard for a drive to secure such an amendment is a proposal to air the alleged denial of supplies to independent distributors by the integrated oil companies.

A number of complaints have been received at the FTC from marketers charging their supplies have been cut off without good reason, and the commission has been asked to make a full-dress investigation with a view to turning the spotlight of public opinion upon the situation.

An airing of similar conditions in the steel industry, marketers' representatives say, has tended to protect many of the nonintegrated units in maintaining a source of supply.

Investigation of the marketing practices of the major companies could lead to action, no matter what the commission found, it is pointed out. If it were shown that the companies are canceling independent customers to secure business for their own outlets, the commission could take formal action against them. On the other hand, if the commission found the companies were within their "rights" but placed independent marketers at a disadvantage, it could ask Congress to enact remedial legislation.

Business Storm Clouds

Administrative officials from the White House down are beginning to show concern over the possibility of a business recession next year.

Trouble, if it develops, will come around mid-1953 when military requirements will begin to level off while raw material supplies and industrial capacity continue to grow. It is a prospect in which, since our economy runs on oil, the petroleum industry has a definite interest.

Only by developing new and expanded civilian markets to take over where the military leave off will it be possible to translate the increased supplies and capacity into the business which industry will need if present labor forces are to be maintained and economic stability achieved.

Studies of possible new domestic markets have already been put under way by Secretary of Commerce Charles Sawyer. Now, President Truman has instructed him to head a mission to make an on-the-ground study of European industrial problems and progress—with particular emphasis upon our business relations abroad and the effect of our policies upon growing business in other countries.

It is highly doubtful that Sawyer will return with an optimistic report of European possibilities for greater absorption of American goods. Recent reports indicate that signs already have appeared of recessionary movements which can be curbed only by further assistance from the United States, and foreign-aid policy is likely to be the first major issue faced by the new administration next year.

Escalation Confusion

The Office of Price Stabilization is running into difficulties with its proposed order banning the application of escalator clauses in contracts for the purchase of natural gas where they would break the planned ceiling of 10 cents per M.c.f.

Considerable opposition to the order has arisen, and congressional committees have evinced interest in the legal and economic considerations involved.

There has been a suggestion that the order might violate provisions of the Defense Production Act, and there is a question whether OPS has the authority to abrogate existing contracts containing escalator clauses.

To add to the confusion, the Federal Power Commission has before it several applications for approval of escalator contracts which are expected to come up for consideration within the next few weeks.

LAUNCHING NOSE of crossing assembly rests on the river bottom, halfway across while locomotives are uncoupled to return for new hitch.

Shell Crosses the Elbe

Locomotives pull four 10-in., two 8-in., and two 4-in. lines simultaneously under the river to Harburg refinery

SIMULTANEOUS laying of eight lines under the Suder Elbe River was carried out recently by Deutsche Shell at its Harburg refinery near Hamburg in West Germany.

The bank of eight lines was pulled across the Suder Elbe River in one operation by railroad locomotives. The under-water distance was nearly a quarter of a mile. There were four 10-in., two 8-in., and two 4-in. lines.

The pipe-line connections across the river were laid to meet the company's need for enlarged refinery tankage. Since the refinery is located between harbor basins, a site was obtained opposite the refinery on the north side of the river at Hohe Schaar. Here, plans call for four tanks, each of about 72,000 bbl. capacity, and boiler and pump houses.

Traffic interference . . . The heavy traffic on the river prevented floating the lines on pontoons and lowering them to the bed of the river. In the simultaneous pulling operation which was decided on, the lines were assembled on the Hohe Schaar side on a sheet-metal platform which in turn was placed on railway track.

The launching nose of the assembly was curved upward at the bow to prevent it from becoming embedded in the river bottom. The pipe lines themselves were insulated with asphalt and glass fiber wrapping and clamped to the sheet-metal platform. A channel about 6 ft. deep was dredged in the river bottom along the route of the crossing.

Special trolley . . . A 2-in. steel cable was attached to launching nose and strung across the river to the refinery side, where it was fixed to a specially made trolley running on track within the refinery. The other end of the trolley was fitted with a snatch block and a second cable which was attached to the three locomotives supplying the pull. The trolley arrangement was necessary since the direction of pull of the lines was not parallel to the existing railway lines.

While all river traffic was halted, the launching nose and bank of lines was pulled into the water on the greased rails at a speed of 2 to 3 miles an hour. During the operation, the position of the nose was marked above water by a long pole set back a short distance back of the bows and connected to a hollow cylinder. When the marker reached a point about halfway across the river, the operation was halted while the locomotives were uncoupled and brought back to the starting point to take a new hitch on the cable.

The operation was witnessed by a group of guests, including the Harburg burgomaster, local harbor authorities, and other officials. W. G. Stok, manager of Deutsche Shell's technical department, described the engineering features of the operation at a lunch given later at the refinery.

Spanish Tests Due

American firms plan three Ebro River Valley wildcats

APPROVAL has been granted by the Spanish government for the first of three proposed oil tests in the valley of Ebro River in northern Spain.

General American Oil Co. of Texas, principal in the deal, together with DeGolyer & MacNaughton, Texas Instruments, Inc., who will do the seismic work, and Delta Drilling Co., contractor on the test wells, plan to spend approximately $1,000,000 in the oil search. That amount was to be matched by the government of Spain.

A drilling concession has been granted on approximately 180,000 acres, in a strip nearly 50 miles long and averaging 5 miles wide, lying 20 miles southeast of the town of Logrono.

This concession is in what is known as the Milagro area, 250 km. northeast of Madrid and 110 km. south of San Sebastian. The area to be drilled lies in the west-central portion of the Ebro basin.

Like Po Valley . . . Topographically, the exposed valley is a broad regional basin lying immediately south of the Pyrenees, and is approximately 240 miles long and 100 miles wide.

Nearest production to this area lies north of the Pyrenees in France. Many geologists consider the structure in the Ebro Valley to be nearly identical with the valley of the Po in France.

Delta Drilling Co. will send a rig to Spain capable of drilling to 12,000 ft. Geological formations are expected to be of the same type as found in East Texas.

At present there is no commercial oil production in Spain, although there are known tar beds in the area to be drilled.

New Flare-Stack Design

A new type of design not heretofore used in the petroleum industry is being

employed in five flare stacks being erected at the three major refineries of Anglo-Iranian Oil Co., Ltd., in Britain.

These stacks, for burning off waste gases from the catalytic cracking units, are about 250 ft. high. They are supported entirely by cables and rest on a small "registering ball" at the base. They are similar to the Skylon erected at the Festival of Britain.

One of these stacks has been constructed at the Llandacy refinery, and another is to be erected there. There will be two at the new Kent refinery and one at Grangemouth in Scotland.

MIDDLE EAST

Iranian Terms Studied

Prime Minister Mossadegh gives British 10 days to accept his proposals in their entirety; no comment from London

IRANIAN Prime Minister Mossadegh last week was seeking to drive the best possible bargain with the British before agreeing to arbitration and possible settlement of the oil-nationalization issue.

The counter-proposals contained in his government's official note to London set out terms which appeared to be almost, but not quite, unacceptable to the British. The lack of any official comment last week from London indicated his message is being studied closely with the hope that the discussions may at least be continued.

The Iranian problem along with other matters was considered at a full British cabinet meeting last week, and an early reply to the Iranian note was expected. The Foreign Office said the question was being discussed with United States officials.

Dr. Mossadegh's note declared that his proposals were valid for 10 days from date of delivery, and further specified that they would have to be accepted in their entirety. This latter condition makes the British-American position even more difficult, and could be the cause for full rejection.

Eye-brow lifter . . . The most astonishing demand made by Iran, in the view of the average western observers, is that Anglo-Iranian Oil Co., Ltd., pay some £49,000,000 ($137,200,000) for an agreement that was never ratified or placed in effect.

In July 1949 the company negotiated an agreement with the government increasing royalties retroactive to the beginning of 1948 and making other changes in the concession agreement of 1933. Pending ratification of the agreement by the Iranian parliament, the company set aside sums to make these extra payments.

It is this money that the Iranian Government now asks to be paid. The agreement was never ratified, and since the nationalization and expulsion of the company's personnel from Iran, Anglo-Iranian has used this money for extraordinary expenses and expansion elsewhere. This demand reflects Iran's extreme need for large sums to meet deficits incurred since the loss of its oil revenue. The Iranian note made this condition somewhat less unacceptable by agreeing to repay the sum in oil if the International Court of Justice should decide that Iran is not entitled to the money.

Abrogation payment out . . . Dr. Mossadegh's proposals regarding compensation for the company's nationalized properties ruled out any possibility of payment for the company's loss from the cancellation of the concession contract which had 42 years more to run.

He said the Iranian Government would submit to arbitration of compensation by the World Court only on the basis that the court determine the amount to be paid for the company's properties in Iran at the time of nationalization.

Apparently in order to give a firm base to the claims that Iran has raised against the company and which would offset compensation for the company, the Iranian prime minister said that the examination of claims for payment would have to be based on either the original 1901 concession, the revised agreement of 1933, the unratified supplemental 1950 agreement, or on "the fairest concession agreements of other oil producing countries."

Purchasing claim . . . In addition, Iran said it would place with the court its claim for compensation from the British Government as a result of the legal threats made against prospective purchasers of the nationalized Iranian oil over the last year. Iran contends that these obstacles deprived her of ability to sell oil.

In the industry, the general belief is that the lack of export sales by the Iranian national company has been due principally to the fact that the international companies quickly served the former Iranian markets with oil from other sources.

One report from London, commenting on the over-all Iranian terms, said that in substance Dr. Mossadegh seems to be asking for a free and clear title to the oil industry without cost, that Britain advance £49,000,000 to Iran, and that he be allowed to sell his nationalized oil wherever he can.

New Concession

Shell acquires rights on water area off Abu Dhabi

ROYAL DUTCH-SHELL has acquired a second Persian Gulf exploratory concession for its own account, according to reliable reports in the industry.

The area involved is that offshore from Abu Dhabi, beyond the 3-mile limit. Abu Dhabi is the westernmost of the Trucial Coast shaikhdoms.

The developments in Abu Dhabi parallel those in Qatar *(The Oil and Gas Journal, July 14, page 84)*. Concession rights originally were obtained by the Iraq Petroleum Co., Ltd., organization. About 3 years ago, Superior Oil Co. interests obtained offshore rights. Subsequent arbitration left Superior with the offshore area beyond the 3-mile line, and Petroleum Concessions (Trucial Coast), Ltd., (I.P.C.) with the mainland and the territorial waters.

Earlier this year, Superior turned back the offshore concessions which it held from both Qatar and Abu Dhabi. Anglo-Saxon Petroleum Co., Ltd., obtained the offshore Qatar concession and is now understood to have similarly acquired the rights formerly held by Superior from the shaikh of Abu Dhabi.

Like a number of other areas in the Middle East, the exact boundaries of Abu Dhabi are in question. Saudi Arabia and Abu Dhabi have not agreed on much disputed territory. The British Foreign Office, which represents these shaikhdoms in foreign affairs, and Saudi Arabian representatives have been attempting to negotiate a settlement of this and other Middle East boundary problems.

Neutral Zone Costs Bared

The exploratory program carried out in the Kuwait-Saudi Arabian Neutral Zone has cost thus far approximately $30,000,000, according to a statement made recently in Liverpool, England, by James MacPherson, vice president and general manager in Kuwait for American Independent Oil Co.

MacPherson was quoted as describ-

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ing Kuwait, where his operations are headquartered, as a marked contrast to Iran in its government-oil company relationships. He said the shaikh is using his oil revenue to build modern hospitals, schools, and roads.

The program in the Neutral Zone adjoining Kuwait has been carried out jointly by American Independent and Pacific Western Oil Co. which hold concessions covering the Kuwait and Saudi Arabian interests, respectively, in the territory. Five wells have thus far been drilled, none of them productive.

Aramco Kicks Off Search

Arabian American Oil Co. opened its 1952-53 exploration program recently when field parties moved from summer headquarters at Dhahran to locations in the Rub Al Khali desert south of Aramco's present producing area in Saudi Arabia.

The parties, consisting of structure drill, seismograph, triangulation, gravity, magnetometer, and surface-mapping units, will remain in the field over the next 9 months, continuing the company's exploration of its concession area.

About 80 Americans and 230 Arabic-speaking employes constitute the total personnel.

Equipment, much of it specially designed for the high temperatures and sand encountered in the operations, includes 14 drilling rigs, 29 specialized camp trailers, 59 Kenworth trucks, 100 dollies and trailers, and 130 light cars.

AUSTRALIA

C. O. R. Sold

A.I.O.C. buys stock held by Australian Government

ANGLO-IRANIAN OIL CO., LTD., has become the sole owner of the Australian company, Commonwealth Oil Refineries, Ltd., through its purchase of the controlling interest held by the Australian Government.

The Australian prime minister, Robert Menzies, announced last week in Canberra that the government had sold its 51 per cent of the stock to A.I.O.C. The price received was £2,762,506 (Australian), or the equivalent of $6,078,013.

Reports that the Australian Government was about to take this action have been circulating for some time. The sale was occasioned by the fact that the Australian Government was faced with the necessity of providing half of the estimated £12,000,000 (Australian) needed for the expansion of C.O.R. distribution facilities to handle the output of the new 60,000-bbl. refinery which Anglo-Iranian is preparing to built near Fremantle in Western Australia.

C.O.R. itself operates a refinery with 2,500 bbl. daily distillation capacity at Laverton, about 10 miles from Melbourne. It distributes throughout Australia under the C.O.R. brand. Of the shares, 425,001 had been held by the Commonwealth Government and 424,999 by Anglo-Iranian. C.O.R. markets about 15 per cent of Australia's total consumption, currently about 90,000 bbl. daily.

Political brawl... The government's action in disposing of its interest provoked a sharp political debate. The leader of the opposition Labor Party asserted it would be "the duty of a future government to restore the position. The Labor Party is not prepared to accept this sacrifice."

The prime minister said Anglo-Iranian had invited the government to contribute the capital involved as a result of the new refinery project, but, he said, it found that parliament lacked power to appropriate money for such a purpose. He said the price received for the government stock was the true value.

The proposal for the government to withdraw from C.O.R. was first advanced about 6 months ago. It was reported to have been rejected at that time by the cabinet after bitter discussion. There has been strong sentiment expressed by many members of the majority party for the so-called oil "denationalization." Last week's announcement of the sale of the government's interest followed a recent resumption of discussions with Anglo-Iranian.

International Briefs

The Venice, Italy, refinery of Industria Raffinazione Olii Minerali (IROM) expects to add about 6,000 bbl. per stream day to its thermal reforming capacity during the current year. Throughput of the refinery is now about 33,000 bbl. daily with current thermal reforming capacity of 1,800 bbl. daily. Other facilities to be added this year include 1,400 bbl. per stream day in polymerization and 470 bbl. per stream day for lubricating oils. The refinery is owned by Azienda Generale Italiana Petroli and Anglo-Iranian Oil Co., Ltd.

A major expansion in capacity is planned by Raffinerie Siciliane Olii Minerali (RASIOM) at its Augusta, Sicily, refinery, according to a report from Augusta. Present capacity of the refinery is about 10,000 bbl. daily. The plans call for an expansion to 1,000,000 tons, or about 20,000 bbl. daily, by September 1953. Reforming facilities will be included in the project.

A 10,000-bbl. per stream day distillation unit and a 5,000-bbl. per stream day Platforming unit is scheduled for completion next year at the Santa Cruz de Tenerife refinery of Cia. Espanola de Petroleos, S.A., (CEPSA) in the Canary Islands. The refinery now has a crude capacity of 27,000 bbl. daily, 3,700 bbl. daily thermal cracking, and 6,000 bbl. daily for lubricating oils. Other facilities include 1,000 bbl. daily for asphalts, and 14,000 lb. daily for waxes.

Capacity of the Trafford Park, Manchester, refinery of Manchester Oil Refinery, Ltd., in England is being enlarged to 3,200 bbl. daily for crude-oil distillation. Present capacity is 2,500 bbl. daily. The company also is expanding its lubricating-oil manufacturing output, now 1,400 bbl. daily, to 1,800 bbl. daily.

Lacq field, discovered in 1949 and now the principal source of crude oil in metropolitan France, now has 15 flowing wells plus 23 others shut in. Proved area of the field amounts to 1,310 acres. Production from the field in 1952 is expected to average about 5,730 bbl. daily of 22°-gravity crude. The operator is Soc. Nationale des Petroles d'Aquitaine (S.N.P.A.). The company's program for the last half of the year calls for drilling six wildcat wells totaling about 39,400 ft. in its concession areas.

Paraffin-wax production is scheduled to be started soon at the new San Roque refinery of Phillips Oil Co. in eastern Venezuela, according to a recent report from Caracas. Final tests of the facilities are now being carried out. The refinery is designed to produce about 2,000,000 lb. a year of paraffin plus a line of conventional petroleum products.

Israel has arranged to obtain oil supplies amounting to about two-thirds of current consumption from Britain until March 31, 1954, the Israeli Legation in London recently announced.

Becomes Consultant

Kaveler to resign from Phillips on November 1

H. H. KAVELER has resigned as assistant manager of the production department of Phillips Petroleum Co. He will open offices as a general consultant on oil and gas production in Tulsa November 1.

Kaveler, who is recognized as one of the industry's foremost authorities on petroleum technology, has been with Phillips since November 1936. He has long been an advocate of wider well-spacing from both an economic and conservation standpoint.

He was graduated from the Missouri School of Mines and Metallurgy, Rolla, Mo., and received his Ph.D. in chemistry from the University of Maryland. He served on the faculty of those institutions and of George Washington University, Washington, D. C.

Before joining Phillips he was employed by the U. S. Bureau of Mines in Pittsburgh. During his career with Phillips he has served in various capacities in the research, economics, and production departments.

Kaveler has taken an active part in the work of the American Petroleum Institute and the petroleum division of the American Institute of Mining and Metallurgical Engineers. He has written papers on pressure - maintenance and unit operations and other problems.

He has served as chairman of operating committees of a number of important unit operations, including the recently formed North Burbank unit in Osage County, Oklahoma.

Jack Tarner, chief reservoir engineer for Phillips Petroleum Co., Bartlesville, Okla., has been appointed technical advisor to the manager. He will be in charge of reservoir studies, unitization, and proration. The appointment is effective November 1.

J. O. Jarman, Colorado City, Tex., independent operator, has gone to Israel to search for oil under a 3-year cable-tool drilling contract with the Israeli government.

David T. Kiester has been promoted from petroleum engineer to superintendent of production for F. Kirk Johnson and Brooks - Scanlon's West Texas operations. He has been transferred from Fort Worth to Abilene, Tex. A graduate of the University of Texas, he formerly was with Ohio Oil Co.

Harold J. Hlavka of Smith Refining Co., Rockford, Ill., has been elected president of the Independent Oil Compounders Association. **H. P. Riley,** Riley Bros., Inc., Burlington, Iowa, has been elected vice president, and **Dan Maurin,** Mid-West Oil Co., Kansas City, treasurer.

W. M. Jones, district engineer at Lubbock, Tex., for Stanolind Oil & Gas Co., has been appointed field superintendent in the Henderson, Tex., area. He replaces **R. G. Peeler,** who has been transferred to the North Cowden area.

Clyde V. Quinn, who supervised expansion of the Texas Natural Gasoline Corp. Benedum gasoline plant near Rankin, Tex., has been named area superintendent. He joined the company in 1948 as construction and operating superintendent of its first plant in Wimberly-Reddin field near Abilene, Tex., and later supervised the building of Texas Natural's Walnut Bend plant near Gainesville.

Joseph B. Kennedy, assistant division superintendent at Casper, Wyo., for Sinclair Oil & Gas Co., has been promoted to superintendent of the Wyoming-Montana division. **Herbert F. Defenbaugh,** district superintendent at Delaware, Okla., has been promoted to assistant superintendent of the Kansas Tri-State division.

Harold B. Meeks, driller for Continental Oil Co., has been transferred from Roundup to Fort Benton, Mont.

P. C. Livesay, assistant general superintendent for Standard Oil Co. (Ind.) at its Whiting, Ind., refinery, has been appointed manager of the projects, capital expenditures, and miscellaneous contracts division in the firm's general offices at Chicago. Livesay joined Standard in 1937 as an engineer at Whiting, and has served as general foreman of the heavy-oils division and as assistant general superintendent.

E. H. Blackaller, executive assistant to the manager of the production department of Stanolind Oil & Gas Co., has been appointed Lubbock (Tex.) district engineer. He joined Stanolind in 1943 following graduation from Texas A & M College, and became an apprentice engineer at Imperial, Tex. Later he served as junior engineer at Brownfield, Tex., and as a petroleum engineer at Fort Worth and in the Texas Panhandle.

Harold L. Hensley, division superintendent in charge of natural-gas processing for Humble Oil & Refining Co. at Midland, Tex., has been appointed assistant director of natural-gas production and processing division of the Petroleum Administration for Defense. He is on a year's leave of absence from Humble. **J. R. Mulvey, Jr.,** of the engineering section of the gas-processing department at Houston, will fill Hensley's job during his PAD assignment.

Robert K. Shivel, spread superintendent for H. C. Price Co., Bartlesville, Okla., has been named superintendent of the pipe-line division. **Robert L. Ezell,** formerly welding foreman, has succeeded Shivel as superintendent of Spread 2. **Roy E. Burgess** has been named administrative manager, and **Harold C. Price, Jr.,** has been appointed administrative assistant of the pipe-line division.

M. W. Goering has been transferred by Amerada Petroleum Corp. from Billings, Mont., to Williston, N. D., as district geologist in charge of operations in the Williston basin. **J. H. Donovan** has been transferred from Casper, Wyo., to Billings as district geologist.

PERSONALS

M. C. Gillis, junior petroleum engineer for Stanolind Oil & Gas Co. at Monroe, La., has been promoted to petroleum engineer at Duncan, Okla.

Richard O. Burk has resigned as a chemical engineer for Standard Oil Co. (Ind.), to join the staff of George Armistead & Co., Washington, D. C., consultants and engineers for the petroleum industry. Burk is a graduate of the Carnegie Institute of Technology.

Billy G. Nippert, production engineer for Arkansas Fuel Oil Co., has been transferred from Allen, Okla., to Tullos, La.

G. O. Mickelson has resigned after 4 years with The Texas Co. to establish his own geological consulting service in Sterling, Colo.

George Berry, district geologist for Sun Oil Co., has been transferred from Casper, Wyo., to Denver as assistant division geologist. Before joining Sun 4 years ago he was a geologist for The Texas Co. **W. N. Fessenden** has been appointed district geologist for Sun at Casper, and **J. M. Hansell** has been named division geologist at Denver.

C. C. Gandaubert, General Petroleum Corp., was one of four members of the Los Angeles Basin chapter of the Pacific Coast district of the American Petroleum Institute who received service citations at a recent meeting. Also honored were **H. F. Dangberg,** Hancock Oil Co.; **William Anderson,** Oil Tool Corp., and **L. C. Johnson,** Union Oil Co.

J. S. Lowe, division mechanical engineer for Shell Oil Co. at Houston, has been transferred to the production division in Oklahoma. **W. M. Booth, Jr.,** area drilling engineer, has been transferred from Tulsa to the Calgary, Alta., area.

William J. Neill of the mechanical engineering section of the Esso Standard Oil Co. Bayway refinery, Linden, N. J., has been promoted to a group head in the equipment-inspection division. **John R. Gibbs** has been transferred from equipment inspection to become an assistant regional engineer. **John G. Hauck,** assistant regional engineer, has been transferred to the mechanical-engineering division. For rotation purposes, **George D. Everett,** group head in project engineering, and **Robert A. Mason,** a group head in mechanical engineering, have traded jobs.

Edwin E. Luper, geologist for Southern Production Co., has been transferred from Fort Worth to Midland, Tex.

F. H. Bockelman has returned from a military leave to his work as district geologist for Tide Water Associated Oil Co. at Houston. **Gaylord O. Owen,** geologist, formerly with Balboa Oil Co., has joined Tide Water at Midland, Tex. **Frank G. Melkie,** associate petroleum engineer for Tide Water at Venice, La., has been transferred to Midland.

Wayne Brawley has joined the staff of Inland Producers, Inc., and C. L. McMahon, Inc., Evansville, Ind. He formerly was associated with Brundred Oil Corp., Oil City, Pa., in Kansas.

Hollis D. Hedberg, formerly manager of exploration in the foreign production division of Gulf Oil Corp. in New York City, has been appointed chief staff geologist for the company at Pittsburgh.

Frank D. Gardner, Midland, Tex., district manager of the crude marketing division for Sinclair Oil & Gas Co., has been granted a leave of absence to become head of the crude-oil and natural-gas section of the Office of Price Stabilization. He will succeed **Patrick McKenna,** who resigned 4 months ago.

W. R. Green, for the past 3½ years district engineer for British-American Oil Producing Co. in the Ventura, Calif., area, has joined John H. Wents & Son, Los Angeles, in consulting work. Prior to joining British-American he had been with Pacific Western Oil Corp. and for 6 years was an engineer with the Kettleman North Dome Association.

William C. Ludi of Standard Oil Development Co.'s Esso Engineering Department, has been named to assist in the engineering and construction of Durban refinery, an installation of Standard-Vacuum Oil Co., Ltd., in South Africa. Ludi, who is a group head in Esso Engineering Department's mechanical-engineering and economics division, will be in Africa about 2 years.

Dr. James B. Herring has been elected to the board of directors of Pacific Oil & Development Corp. He succeeds **Louis J. Badouin,** who resigned.

T. J. Brooks, for the past 5 years a geologist with Standard Oil Co. of California in the San Joaquin Valley area, has joined Franco Western Oil Co. at Bakersfield. He is past secretary-treasurer of the San Joaquin Geological Society.

Gyle Atterberry, tool pusher for R. W. Rine Drilling Co., has been transferred from Lamar, Colo., to Elkhart, Kans.

S. R. Knapp, tool pusher for Falcon Seaboard Drilling Co., has been transferred from Ardmore to Elk City, Okla.

Harold L. Geis has resigned from the R. B. Mitchell Co., consulting firm, to become an independent geological consultant at Houston. He formerly was division geologist for Barnsdall Oil Co., and has held positions with Shell Oil Co. and Atlantic Refining Co. He holds a master's degree in geology from the University of Illinois.

W. Ray Staples, formerly a partner in Cable & Staples, a consulting engineering firm of Wichita Falls, Tex., has been appointed production engineer for San Juan Oil Co. at Dallas.

Gregg B. Burkhalter, on leave of absence since last February from his post as assistant division manager for Gulf Oil Corp., has been named chief of the petroleum branch of the Office of Price Stabilization. He succeeds **Loring T. Cramer,** whose resignation became effective September 30. Burkhalter has been serving for several months as head of the lubricating-oils, asphalt, and miscellaneous-products section of the petroleum branch.

Charles H. Murphy, Jr., El Dorado, president of Murphy Corp., has been elected president of the Louisiana-Arkansas division of Mid-Continent Oil and Gas Association. He succeeds **A. R. Carmody,** Shreveport, who held the position 7 years. Elected vice presidents of the division were: **John J. Frommer, W. C. Fullilove, Jr., Joe T. Goodman,**

"The Record Speaks for Itself"

Fast cleanup. W. H. Harder's International TD-14A crawler is a real producer on this lease near Borger, Texas, where the tractor is shown winding up cleanup work around a well in a jiffy.

Texas oil field contractor finds record workpower, durability in his TD-14A

Up until 1948 W. H. Harder, oil field contractor from Borger, Texas, was a mighty hard fellow to please when it came to crawler tractors. It seemed to him he was always paying too many repair bills and getting too little work out of his crawlers in return. But 1948 was the year he bought his first International TD-14A and things are different now.

"The record made by my Internationals in the last four years speaks for itself," says Harder. *"We worked other tractors of equal size alongside our first TD-14A and our International outclassed the field. As for upkeep, that TD-14A worked for more than 10,000 hours. Rails and rollers were replaced at 7,000 hours and that old engine never did need anything but one set of rings and valves."*

If you are plagued with crawler problems, see your International Industrial Distributor. He can give you a sure-fire prescription for profits: International—Power that Pays.

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SEE YOU AT THE POLLS!

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POWER THAT PAYS

PERSONALS

C. H. Lyons, H. Tarver, A. H. Weyland, and **M. C. Hoffman,** all of Shreveport; **J. H. Rambin, H. C. Teadel, Bouwe Dykstra,** all of New Orleans; **L. Lee Welch,** Lake Charles, La.; **R. G. Lawton,** Magnolia, Ark., and **W. H. Rector,** Little Rock.

Robert F. Mathews, who has been with the geological department of Continental Oil Co. at Wichita Falls, Tex., the past 4 years, has been transferred to Midland, Tex.

A. W. Cullen, Rocky Mountain exploration manager for British-American Oil Producing Co., has resigned to do independent consulting work in that region. He has established temporary headquarters at Denver.

Gordon Cochran, oil-field safety supervisor of the Provincial Workmen's Compensation Board, has resigned to join Arrow Drilling Co. of Canada, Ltd., in its joint safety program with Trident Drilling Co. and Canbridge Drilling Co. He will be chief safety director of all drilling operations.

John T. Murphy, Jr., party chief for Atlantic Refining Co., has been transferred from Aberdeen, Miss., to Thermopolis, Wyo.

Boris V. Lerke and **R. A. Whortan** have dissolved their partnership at Wichita and will continue business individually, Lerke as consulting geologist and micropaleontologist, and Whortan as consulting geologist and oil operator.

Merle Thorpe, Jr., who has been assistant general counsel of the Petroleum Administration for Defense since April 1951, has been appointed associate general counsel, and **Harry W. Frazee,** counsel for the refining division since June 1951, has been named assistant general counsel.

Earl S. Neal, formerly head of the producing economics section for Standard Oil Co. (N. J.), has been appointed general manager of the producing department of Imperial Oil, Ltd. He succeeds **W. O. Twaits,** who became a vice president of the company last January. Neal was a geologist for Lago Petroleum Corp. in Venezuela from 1926 to 1938. He was transferred to Jersey Standard in New York and placed in charge of world-wide reserve studies.

Leslie H. True, president of Magnolia Pipe Line Co., has been elected a director of Southland Life Insurance Co.

William J. Turner has been appointed regional reservoir engineer for Atlantic Refining Co. at Tulsa.

William C. Wunnicke, field engineer for Stanolind Oil & Gas Co. at Hobbs, N. M., has been transferred to Farmington, N. M., as farm boss.

Claude Richard Hocott, Houston, assistant head of the production research department of Humble Oil & Refining Co., was named chairman October 1 of the petroleum branch of the American Institute of Mining and Metallurgical Engineers at the organization's annual meeting in Houston. Vice-chairmen named were: **Basil P. Kantser,** Los Angeles, and **John P. Hammond,** Tulsa.

DEATHS

Henry M. Dawes, 75, chairman of the executive committee of Pure Oil Co., died in an Evanston, Ill., hospital September 29. He had been president of Pure for 23 years before becoming executive committee head in 1947. He was engaged in the lumber business for 11 years following his graduation from Marietta College in 1896. Then he became president of Southern Petroleum Co. in Marietta. In 1906 he moved to Chicago, where he became secretary and treasurer of Dawes Brothers, Inc., in which he was associated with his three brothers, Beman G., Newark, Ohio, the late Rufus C., and the late Charles G. Dawes, former vice president of the United States. In 1923 and 1924 he served as comptroller of the currency of the United States and later as a member of the Federal Reserve Board. He was a director of the American Petroleum Institute, and a former vice president.

George Beverly Barham, 73, Shreveport drilling contractor, died in a Shreveport hospital September 26. Before his retirement 8 years ago he had operated extensively in Arkansas, Oklahoma, Texas, Louisiana, New Mexico, Wyoming, Mexico, and South America.

Albert Leon Beekly, 68, retired chief geologist for Mid-Continent Petroleum Corp., died in a Tulsa hospital September 29. He had retired in 1950 after 33 years with Mid-Continent and its predecessor, Cosden Oil Co.

Frank Borges, 51, driller, died recently in a Long Beach hospital.

Fred A. (Jack) West, 72, who worked about 22 years as a mechanical engineer for Shell Oil Co., died of a heart attack in a Tulsa hospital September 26.

George R. Lang, 58, Tulsa, president and owner of Beacon Drilling Co., died September 30 in Oklahoma City. He joined Carter Oil Co. as a land scout in 1916 and become vice president and director in 1932. He was with Standard Oil Co. (N. J.) in New York before joining Manahan Drilling Co., which later became Beacon Drilling Co. He was a regional director of the American Petroleum Institute.

Monroe G. Cheney, 59, president of Anzac Oil Corp., and a past president of the American Association of Petroleum Geologists, died at his home in Coleman, Tex., September 27.

William H. Cree, 57, Signal Hill, Calif., operator, who developed the Cannon lease there, died September 24 at his home in Long Beach.

Arthur Bert Allen, Wichita, field superintendent for the J. J. Lynn Oil Co., of Kansas, died in an automobile accident near Mineral Wells, Tex., September 28.

Sam G. Uzzell, 53, tool foreman for Magnolia Petroleum Co., died September 22 in Andrews, Tex. He had been employed by Magnolia 25 years.

J. W. (Sandy) Sandberg, refinery manager for Lakeside Refining Co., Kalamazoo, Mich, died September 27.

MUDS . . .

BITS . . .

Improved Tools and Methods

by H. B. Woods*

TO keep the constantly increasing costs of drilling oil wells from becoming prohibitive, drilling contractors and oil companies with the close cooperation of progressive suppliers and manufacturers have been very successful in developing and improving both oil tools and drilling methods.

It is the purpose of this paper to discuss some of the developments that have become standard practice in the last few years and also to discuss newer developments.

Oil-Emulsion Muds

Much progress has been made in recent years in the development of oilfield muds. Of particular interest are oil-emulsion muds. They are more or less conventional drilling muds to which oil has been added, forming an emulsion containing aqueous fluid as the continuing phase. The emulsion is maintained by emulsifying agents either initially present in the mud or added with the oil. During the last 2 or 3 years the use of oil-emulsion muds has been studied under a wide range of operating conditions. After adding the emulsifiable oil to conventional drilling muds, the following results have been obtained:

1. An increase in drilling rate and a lower rate of wear on both cutting surfaces and bearings, resulting in more hole per bit. The increase in drilling rate is especially pronounced when the oil is added to low-water-loss mud.

2. A general reduction of sliding friction in the hole evidenced by lower rotary torque, reduced fishing problems, reduced tendency for bits to ball up, and indications that more of the weight, as shown by the weight indicator, is actually being applied to the bit.

3. A reduction in the amount of hole enlargement normally experienced in many shale sections.

4. A reduction in surface mud pressure for the same rate of circulation.

5. Increased well productivity when used in drilling-in operations.

To minimize confusion in establishing the presence of formation gas or oil, refined diesel oil is generally added. While the diesel oil imparts a fluorescence to the cuttings, it is said to be readily distinguishable from the fluorescence imparted by formation oil.

In spite of the higher cost of oil-emulsion muds, their use has resulted in net over-all savings in many drilling operations.

*Assistant director, research engineering, Hughes Tool Co., Houston. Presented at petroleum division meeting, A.S.M.E., Kansas City, Mo., September 22-24.

Air or Gas as a Flushing Fluid

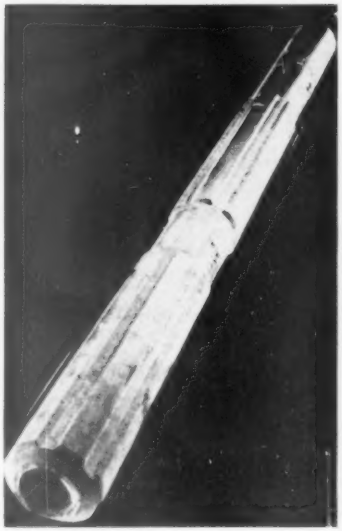
The rotary method for drilling blast holes in rock quarries was introduced several years ago. Conventional three-cone oil-field bits were used and weights and rotary speeds were comparable to those used in oil-well drilling. Water was used as the circulating fluid. In 1949 and 1950 the use of compressed air instead of water was introduced. A marked increase in drilling rate and footage resulted. It was also discovered that the bearings and cutter teeth lasted longer.

Following this, seismograph operators experimented with the use of air in place of drilling mud. Similar performance improvements were noted as long as the holes remained dry. If, however, a water-producing formation was encountered the cuttings would become gummy and plaster on the walls of the hole and, at times completely plug the hole.

The method has been extended to the drilling of oil and gas wells using either compressed air or natural gas. As long as no fluid producing formations were encountered the results have been phenomenal. Possibly the most spectacular is a test made in Val Verde County, Texas, where with natural gas the flushing fluid, 9 rock bits were used in 9 days in drilling a section that had required 43 rock bits in 26 days with conventional mud circulation on a neighboring well. These results appear fantastic but they are not out of line with improvements experienced in other wells where gas or air drilling has been tried.

Considerable thought has been given to possible reasons for the large increases in total footage and drilling rate. While in the rock quarries substantial improvements are noted, the degree of improvement is still greater in oil wells. It is the author's belief that the gas removes chips faster than water, and that there is more friction between the cutter teeth and the rock when gas is used. This causes the teeth to bite in and penetrate rather than slide, and there is no slime layer on the hole bottom to cushion the impact of cutter teeth.

When drilling with gas in a deep well, the fluid pressure at the bottom of the hole is no greater than a few atmospheres while the formation pressure is of a magnitude of roughly 1 psi. per foot of depth. This difference in pressure in different directions on the formation directly under the rock bit must set up very high shear stresses



DRILL COLLARS . . .

AIR DRILLING . . .

Keep Drilling Costs Down

Oil-emulsion muds, gas drilling, jet bits, long strings of drill collars, diamond bits, mud-percussion tools, other new developments insure faster, more economical drilling.

on the rock bottom. Under these conditions it may take only a slight disturbance to produce a large rock chip. When drilling with mud in the system, stresses on the bottom of the hole are more nearly balanced because the weight of the rock removed from the hole has been partly replaced by the weight of the mud.

After a chip is cracked but still in place, the forces needed to remove it are proportional to the fluid pressure as long as the circulating fluid does not leak in behind it. With air drilling this fluid pressure is of the order of a few atmospheres. With mud drilling it may be of the order of 5,000 psi.

Jet Bits

In the conventional rolling-cutter rock bit, nozzles are positioned to direct the mud stream onto and around the cutters. This washes the cutter teeth free of cuttings and cleans the bottom of the hole. The linear velocity of the mud through conventional nozzles is generally held below 100 ft. per second. If it is much higher than this the cutters may become mud cut.

A few years ago it was found that higher drilling efficiency could be obtained on drag bits when the bit nozzles were positioned to direct the mud to the bottom of the hole ahead of the cutting edges and when much higher fluid velocities were maintained through the nozzles. High-velocity jets tried on rock bits also resulted in improved performance.

Since these initial tests, a number of jet-rock-bit designs have been developed. The fluid stream is directed onto the bottom of the hole rather than onto the cutters. Backwash from the stream cleans the cutters. Nozzle velocities are maintained considerably higher than would be possible on conventional bits where the mud stream impinges directly on the cutters.

Performance records have shown that in many areas, the use of jet rock bits has resulted in reduced cost of drilling evidenced by more hole per bit, an increase in drilling rate, and a reduction in rate of wear on both teeth and bearings. The degree of improvement varies with the formations being drilled, the type of mud, the jet velocity, and mud circulation rate.

Some of the earlier work indicated that drilling-rate increases were experienced with jet operation even in hard rock. These results have been confirmed by other carefully controlled laboratory and field tests. The indications are, though it has not been definitely proved, that the relative increase in drilling rate in jet operation on hard rock is less as the mud properties approach those of clear water.

For each formation, mud type, and circulation rate, there is probably a jet-nozzle velocity below which jet bits show no improvement over regular bits. There are cases where 200 ft. per second jet velocity gave little improvement over conventional bits. There are also cases where 175 ft. per second jet velocity showed enough improvement to justify the use of jet bits.

If, under conventional bit operation, just enough mud is being pumped properly to lift cuttings and cavings to the surface, at least this same amount of mud must be circulated under jet-bit operation. An additional pressure of at least 200 psi. or so must be maintained with jet bits to produce the desired jet velocity. Under these conditions, the pump and prime movers must have enough additional capacity to deliver the same volume of mud at this higher pressure.

On the other hand, if, with conventional bit operation more mud is being pumped than the minimum required for satisfactory lifting of cuttings and cavings, it may be possible to use smaller liners with jet bits and pump a smaller amount of mud but still sufficient properly to clean the hole and get a satisfactory jet velocity without any increase in pump horsepower. The combination of nozzle size, liner size, and volume of circulating fluid should be adjusted so that the pumps or prime movers are being operated at close to capacity.

A study of the hydraulic losses will often show that a large part of the total pump pressure is expended in pumping the mud through the pipe and drill collars. A redesign of the drilling string may effect enough reduction in pressure to permit either the use of the same pumps and pump engines at greater depths or to permit jet bit operations with pumps and engines that are too small with the existing drilling string. This trend is reflected in a change from 3½-in. internal flush pipe with internal flush tool joints to 4-in. internal upset pipe with extra-hole tool joints.

The results on jet bits to date indi-

cate that they may be used to advantage in a wide range of formations in many areas with present rig equipment. They also indicate that, in many cases, if pump and driving motors were of higher capacity, the additional savings effected would be more than enough to offset the cost of the additional equipment.

Long Strings of Drill Collars

The use of long strings of drill collars has become common practice in West Texas. As an example, 450 to 900 ft. of collars of from 6¼ to 6¾-in. diameter are currently in use in 8¾-in. holes. Operators have found their use permits the application of heavier weights on bits with resulting faster rates of penetration and more hole per bit. Carrying all of the applied weight in drill collars rather than part of it in pipe resulted in reduced drill-pipe failures. In areas where crooked-hole problems are minor, the use of the long strings of collars has resulted in greatly reduced drilling costs particularly through the hard sections.

Failures in drill-collar connections have been kept to a minimum by improved connection designs, metallurgy and handling techniques, by prestressing surfaces at critical sections, and by the use of anodic corrosion inhibitors at critical exposed surfaces.

Where crooked-hole trouble is experienced, operators have tried to devise methods of drilling without excessive reduction of weight which would result in much lower drilling rate. Some operators are using two or three 8-in. diameter collars at the bottom of a string of 6¾-in.-diameter collars in 8¾-in. holes. The theoretical advantages of large-diameter collars as an aid in keeping holes straight are threefold: (1) they concentrate drilling weight closer to the bit; (2) the collars are stiffer and it is more difficult for them to bend around a corner; (3) the lateral clearance between collar and wall of the hole is less, so that even though the collar is lying against the side of the hole, it is more centrally located.

Stabilizers

The use of 8-in.-diameter collars in 8¾-in. holes is considered hazardous in many areas. Lubinski has shown the possible advantage of using stabilizers as an aid in maintaining acceptable hole deflection. He has shown that it is desirable to place the stabilizer at approximately the position where the collar first contacts the wall of the hole above the bit.

The use of a reamer just above the bit, and a stabilizer one or two joints above, is used by some operators when drilling through crooked-hole chert sections with reported success.

There is considerable interest in developing some kind of stabilizer that will keep the collar axis more or less lined up with hole axis and still will not present too much of a fishing problem.

A 10-ft.-long sub with two staggered sets of 3-ft.-long ribs welded on it is being used just above the bit by one contractor. The diameter across the ribs is ⅛ in. under the nominal hole diameter.

Another type has spiral ribbed cast-iron sleeves within which the collar is free to rotate. The sleeves are restrained from upward movement on the drill collar by shrunk-on rings. A cam is provided below the sleeve to prevent rotation of the stabilizer if necessary to mill for a washover job.

Experiments have been made with a series of steel-reinforced rubber sleeves mounted on the drill-collar body. The rubber sleeves form cutless rubber bearings similar to the underwater bearings used on ship propeller shafts.

Diamond Core and Drilling Bits

The outstanding success of diamond coring as an economical way to make hole in Rangely field in Colorado late in 1946, caused its use in many other areas. At the present time there are many sections where diamond coring is cheaper than any other type of coring and core recovery is better. In some cases diamond-core bits will core hole cheaper than it can be drilled by conventional drilling methods. This is in spite of the fact that the bit must be pulled at intervals for core removal.

Continued work is being done to develop a diamond bit that may be kept in the hole until the bit is dulled. The solid diamond bit has been used for this; however, the diamonds near its center have a low linear velocity compared to those near the outside and necessarily carry a higher percentage of the total load. This means that in drilling high-strength rocks the center diamonds may become overloaded and crumble out prematurely. If the crushing strength of the formation is low enough that the formation near the center crushes out, rather than the diamonds, performance may be satisfactory. This is the case in the Spraberry shale formations where solid diamond bits are widely used.

Some operators have tried a conventional diamond core bit with a small-diameter hard formation three-cone rock bit mounted in the core space to break the core as it forms. Its use seems to be limited to formations in which an appreciable amount of hole can be made by the rock bit before it is dull.

A diamond-core bit with retractable wire-line barrel that may be replaced with a small solid diamond bit has application in some areas. The small solid bit has the same disabilities as the full-size solid bit in the stronger formations.

Mud-Operated Percussion Tools

The conventional rolling cutter rock bit drills hard rock by a crushing action and heavy loads (3,000 to 5,000 lb. per inch of bit diameter) are often needed for most efficient drilling performance. As the bit rotates on bottom the substantially uniform applied load is being successively transferred from one group of teeth to another.

In percussion drilling the force exerted on bottom by each tooth during impact is very high. However, during the period of time between impacts there is either no force on bottom or it is comparatively low. Since the weight on the bit is the average of the load on bottom throughout a complete cycle and for a large part of the cycle the applied load is quite low, it has appeared that with the percussion method satisfactory penetration rates might be obtained with much less average weight on the bit than with the conventional rotary method. Also it has appeared that with its use acceptable hole deviation might be maintained with higher drilling rates because of this reduced average weight on bottom.

Several companies have been working on the problem of developing satisfactory mud-operated percussion tools. Two general types of operation are being investigated. In one, the bit rotates on bottom with a preload and a reciprocating hammer strikes an anvil to which the bit is attached. In the other, the bit is picked up off bottom and hammered onto bottom each stroke.

The first type has been extensively tested. Field experience has shown that in hard, friable, formations higher drilling rates and more hole per bit may be obtained with it than in conventional drilling. In several cases in drilling steeply dipped formations, acceptable deviation has been maintained, at considerably higher drilling rates, than possible when drilling conventionally.

The developers of the second design, in which the bit is picked up off bottom between blows, believe that the continued scraping of the gage surface against the low side of the hole will be very effective in straightening crooked hole. However, the tool has not been developed to a point where more than short field runs have been obtained.

It is the author's belief that eventually some type of fluid-operated percussion tool may be developed that will have commercial application in some types of oil-field drilling.

JET FUELS

. . . Specifications, manufacture, and current and future usage—

A Symposium†

The Small Refiner's Role

Broad specifications mean that the average refiner can make jet fuels with little change in stabilized gasoline or kerosine streams.

by W. F. Krause*

THE jet engine has made it possible for the small refiner to participate in the defense effort and produce aviation fuel for modern planes. The refining facilities of the small plant are adequate and suitable for production of most of the grades of jet fuel.

Each operator should survey his facilities and determine what the production of jet fuel can do for him as well as what he can do for the defense effort. There are certain advantages to the refiner in the production of jet-engine fuel that should not be overlooked.

1. It gives additional diversification of products and opens new markets.

2. It will put the refiner in an advantageous position for supply of jet fuel to civilian commercial air lines when that new, future market develops.

3. In case of national emergency the production of jet fuel will be an aid toward continued crude supply and operation of the small refinery.

4. Increasing the importance of the small refinery by production of jet fuel serves as an aid to the expansion and improvement of small-refinery facilities.

5. By use of low-octane straightrun gasoline and naphtha in jet fuel; a refiner can, in this way, improve the octane level of his gasoline base stocks and decrease the amount of tetraethyl lead required for motor gasoline.

There are currently three types of jet fuels in production and use.

Referee jet fuel . . . This is a specialized fuel requiring unusual ingredients. Referee fuel is very necessary to the testing and development of jet engines but it does require special ingredients to meet its requirements and production is now confined to the major refiner. It is doubtful if the small refiner has either the ingredients or the desire to make such a fuel. (See Table 1, "Development of Specifications for Jet Fuels," this symposium, for specifications).

Referee jet-fuel production requires well-fractionated ingredients where each component imparts certain properties to the completed blend. A stabilized natural gasoline is required for volatility control; straightrun gasoline and naphtha for distillation; a stable thermal cracked gasoline or catalytic cracked gasoline for aromatic content.

To bring the aromatic content up to minimum 20 per cent it is necessary to add toluene or xylene in most cases except where high-aromatic West Coast crudes are used. Kerosine is added to control additional points of distillation specification. Sulfur content of minimum 0.3 per cent is a problem for all except those refiners operating on high-sulfur crudes.

There are so many points of control in the specifications that it is difficult to fall within the prescribed limits at all points when the ingredients are put together. Referee fuel is thus a specific case to be studied by each refiner.

JP-4 fuel . . . Grade JP-4 is the fuel currently being supplied to most jet aircraft, and it is this fuel which should be most interesting to the small refiner. An examination of Specification Mil-F-5624A (Table 1, "Jet Fuel Specifications") shows that it is extremely lenient as contrasted with the rigid requirements for aviation fuel for reciprocating engines.

The vapor pressure limits the amount of volatile components, while the freezing point limits the amount of kerosine or distillate in the blend. Between these points there is wide latitude. The refiner can produce jet fuel in token amounts or make up to 40 per cent of crude run while still meeting the JP-4 specifications.

The specifications are sufficiently broad that the average refiner can make JP-4 with little or no changes in sta-

EDITOR'S NOTE: In the event of war, petroleum refineries in the United States will be called on for all-out production of jet and other fuels for the Armed Forces. Specifications are such that the small refiner can divert a large part of his refinery run to the production of jet fuels without installing specialized equipment.

The rapid development of jet engines makes it highly important that the refiner take a good look at possible production of jet fuel in his plant. These five articles bring together a wealth of needed information on jet-fuel specifications, how the refiner can adapt his processing equipment for jet-fuel production, military jet-fuel requirements, use of jet fuel by civil aircraft, and suitability of jet fuels.

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†Adapted from a symposium on "Jet Fuels —Present and Future," National Petroleum Association, Atlantic City, September 1952.

bilized gasoline or kerosine streams. This jet fuel does not require special ingredients and it can be readily produced by any refinery now making motor gasoline and burning oils.

The simplest topping unit with a single crude-fractionating tower is potentially a source of supply of jet fuel. All that is required is to take a light gasoline fraction overhead and then withdraw naphtha and kerosine fractions as side cuts from the tower for use as jet fuel. Sidecut strippers are not required because the jet fuel requires sufficient volatility to produce minimum 2-lb. vapor pressure and the presence of small amounts of light ends is required.

This is an extremely simple case and probably does not represent a true picture of operating facts because, actually, it is doubtful if any refiner will convert to 100 per cent production of jet fuel to the complete exclusion of naphtha or kerosine production. The case is cited to show that no facility is too small or simple to be considered as a jet-fuel manufacturer. In most cases jet fuel will be incorporated into the operation with continued production of decreased amounts of gasoline, solvent naphthas, and kerosine.

JP-5 fuel . . . Grade JP-5 is the newest grade of jet fuel and many refiners may not be familiar with it. The specifications are covered by Mil-F-7914 (AER) available from the Commanding Officer, U. S. Naval Air Station, Johnsville, Pa., Attention—Technical Records Division. Production of this fuel will come entirely from the kerosine and burning-oil fraction and will have no bearing on the gasoline yield or quality as does JP-4.

In many cases the refiner's regular grade of kerosine will meet all of the requirements for JP-5 jet fuel. Each refiner should evaluate the production of this military fuel against his regular market for kerosine and burning oil.

At the present time, and probably for some time to come, the principal demand is for JP-4 jet fuel. It is this fuel which the refiner should study most closely. Essentially it is a blend of stabilized gasoline, naphtha, and kerosine. In case of emergency, with large requirements to be met, it would be necessary to use both cracked and straight-run products to meet the volume demands.

Under normal conditions the refiner can select the straightrun products for the jet fuels. This has the advantage of making a more stable jet fuel as well as removing the low-octane ingredients from the motor fuel stocks. This point of increasing the octane level of base stocks for motor gasoline by using the straightrun for jet fuel should be taken into account when evaluating the economics of jet fuels against gasoline and burning-oil production.

Production tests . . . Jet fuel is easily manufactured and no special treating facilities are required. The fuel does not have to be doctor sweet but the mercaptan content must be below 0.005 per cent. On many stocks a caustic wash will meet this requirement. If the fuel is sweetened by the doctor process, care must be taken in the treating to prevent a corrosive product. The corrosion specification is important and Air Force inspectors watch it very closely. However, if the refiner exercises reasonable care in treating there will be no difficulty.

All of the inspection tests are relatively simple and require no extraordinary equipment. The average small-refinery laboratory will have no difficulty making the required control tests on the jet fuel. No expensive, special knock-test engines are required because jet engines have no octane requirements and therefore the fuels have no octane specifications.

The only piece of equipment the small refiner may not have in his laboratory prior to jet-fuel manufacture is the steam jet gum apparatus. However, this new apparatus is now being used for evaluating diesel fuels and burning oils and will soon be necessary in all laboratories. Therefore, laboratory facilities should present no problem.

Blending operations . . . The refiner may have to make certain changes in operation to produce jet fuel and will have to take certain precautions to insure the quality after the fuel is blended. The stocks selected should be clean and well fractionated to give a low steam jet gum residue. This will be of increasing importance as more prevaporizing jet engines come into use.

The gasoline stocks included in the blend should be stabilized to about 5 lb. vapor pressure in order to meet the minimum 2-lb.-maximum 3-lb. vapor pressure specification of the JP-4. The blending of gasoline, naphtha, and kerosine can be done either before or after treating, whichever is best suited to the facilities. The gasoline stocks can be copper sweetened and the kerosine stocks doctor treated without harm to the finished jet fuel.

Tanks and lines . . . The tanks and lines should be arranged in such a manner that the system can be isolated and sealed after the blend is completed, inspected, and approved. There should be a separate loading line so there is no possibility of contamination by other refinery products. A separate loading and transfer system is desirable from the refiner's standpoint because it insures there will be no contamination of refinery gasoline or burning oils by the jet fuel.

Jet fuel cannot be handled through refinery lines used for other products because it is too heavy for gasoline and will spoil the flash point on burning oils. There is the added disadvantage to jet fuel that if a blend is off-specification and cannot be approved for shipment there is almost no alternative except reprocessing it as slop oil. Therefore, it is important that the refiner be sure the components are right before putting them together to make the final jet fuel blend.

Tank cars, trucks, or barges should be clean, dry, and approved before loading. Because this is an aircraft fuel every precaution must be taken to deliver a clean, dry fuel to destination. For truck or tank-car loading there should be a filter in the loading line to remove rust particles or any other foreign materials. A filter is not deemed necessary when loading barges at the refinery because such cargoes usually go into intermediate storage before delivery to the aircraft. Presumably the fuel is then filtered when delivered to final destination.

Future production . . . In general, it appears that jet fuels are truly the small refiners' aviation "gasoline" and these refiners can help themselves and the defense effort by the production of these fuels. At the present time, and particularly since the oil strike of last May, the shortage of motor gasoline makes the production of jet fuel somewhat unattractive to the refiner. However, on the long-range consideration of probable increase in jet-aircraft requirements as well as balancing of motor-fuel stocks the picture is much more in favor of the production of jet fuels.

"In many cases the refiner's regular grade of kerosine will meet all the requirments for JP-5 jet fuel. Production of this fuel will have no bearing on gasoline yield or quality."

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Development of Specifications . . . for jet fuels

by Carl W. Kelley*

AS better jet engines are developed, economics and efficiency of operations will dictate the use of higher-grade fuels. This trend is illustrated by the various grades of jet fuel which have already evolved, and by the changes in specifications thereby effected.

An analysis of some of the specifications shown in Table 1 will show the reasons why changes have been made.

Specification MIL-F-5161B fuel, referee, aircraft turbine, and jet engine referee fuel for JP-4 specification, was written in order to insure that adequate consideration will be given to fuel-quality variations in jet-engine design during peacetime so as to be prepared for the relatively poorer fuel that will be produced in the time of emergency. The N.A.C.A. Subcommittee on Aircraft Fuels, in cooperation with the aircraft industry prepared the recommended specification limits on the referee fuel. Likewise 5161 was written for JP-1 and 5161A written for JP-3 specification.

*Office of Petroleum Programs, Munitions Board.

Referee fuel . . . To outline more clearly why a referee fuel specification is required, possibly some comments should be made on manufacturing practices under peacetime and wartime conditions. Under peacetime conditions, only small quantities of jet fuel will be required. Under these circumstances, the majority of refiners will make a fuel to the specification in the easiest possible way, which usually involves the blending of available products.

In most cases, therefore, the refiner will take those stocks least valuable to him as a motor fuel and either his current production of No. 1 fuel oil or kerosine. The blending of such products will result usually in a fuel having a relatively low end point, low bromine number, low aromaticity, etc. Cracked gasoline stocks will not be generally used, inasmuch as they have more value than straightrun stocks in motor-gasoline blends.

Under wartime conditions, it is anticipated that the demand for jet fuel will be extremely high and will require ingenuity on the part of the refiner to maximize production by including various quantities of cracked gasolines and cracked fuel-oil fractions. These will tend to increase bromine number and aromatics toward the limit of the specification—increase gum content, increase boiling range and sulfur content, and decrease gravity and heat of combustion.

It is therefore important that engines designed for wartime use be built to handle the wartime fuel and not the easier-to-handle type of fuel available commercially in peacetime. The purpose of the referee fuel is to make such a fuel available for design and testing. Engine development contracts call for referee fuels for primary qualification.

Fuel requirements . . . In considering the general requirements of jet fuels, availability heads the list since it is the most important from the military viewpoint. Unless a fuel can be produced in sufficient quantities during an emergency, it is of little value no matter how exceptional it may be from a performance standpoint.

Third on the list of general requirements is the question of flammability or fire hazard. There is no such thing as a "safety fuel" since any fuel that will burn in an engine also will burn outside if given the right set of conditions. However, the important factors are ease of ignition and speed with which fire spreads. Service experience and laboratory tests indicate big differences in this respect.

It has been demonstrated that at an atmospheric temperature of 100° F. the minimum 10 per cent A.S.T.M. distillation temperature should be approximately 350° F. In military operations considerations of availability and low-temperature starting rule out the use of a less-volatile fuel and a compromise is made on a fuel as JP-4.

The fourth requirement of jet fuels is its low-temperature properties since this is one of the most important factors in aircraft operations. Military operations require starting at atmospheric temperatures of —65° F. or

TABLE 1—JET FUEL SPECIFICATIONS

	MIL-F-5616 Amendment 1 July 25, 1950	MIL-F-5624A January 23, 1951		MIL-F-7914(AER) March 11, 1952	MIL-F-5161B July 26, 1951
	JP-1	JP-3	JP-4	JP-5	Referee fuel
Freezing point, °F.	—76	—76	—76	—40	—60
Corrosion Cu strip	Pass	Pass	Pass	Pass	Pass
Residue or existent gum:					
Max. mg./100 ml.	5.0	10.0	10.0	10	10
Aromatic per cent max. by vol.	20	25	25	25	20
Total sulfur:					
Maximum per cent by weight	0.20	0.4	0.4	0.5	0.4
Minimum					0.2
Mercaptan sulfur:					
Maximum per cent by weight	.005	.005	.005	.005	.005
Gravity, °A.P.I.:					
Maximum		63	58	50	58
Minimum	35	45	40	35	40
Vapor pressure, psi.:					
Maximum		7.0	3.0		3
Minimum		5.0	2.0		2
Accelerated gum:					
Max. mg./100 ml.	8.0	20.0	20.0	20	20
Distillation, °F.:					
10 per cent minimum evap.	410	0	250	410	220
90 per cent minimum evap.	490			550	450
90 per cent maximum evap.		400		550	
End point, maximum	572	600	550		
Residue, per cent max.	1.5	1.5	1.5	1.5	1.5
Distillation loss, per cent max.	1.5	1.5	1.5	1.5	1.5
Bromine number:					
Maximum	3.0	30.0	30.0	30	30
Minimum					5
Heat of combustion:					
Minimum B.t.u./lb.		18,400	18,400	18,300	18,400
Maximum B.t.u./lb.					18,600
Inhibitor, lb./5,000 U.S. gal.		1	1	1	
Water tolerance:					
Change in color allowed		None	None	None	None
Max. volume change per layer, ml.	2	1	1		
Acidity, mg. KOH/gm. of fuel					
Color, Saybolt not darker than	+12				
Flash point, °F. min.	110			140	
Viscosity CS at —40° F.	10			20	

lower. Experience has clearly demonstrated that the —76° F. now used in JP-4 fuel specification is a realistic figure and cannot be compromised without imposing severe operational limitations.

Volatility is another general requirement for jet fuels since it governs the evaporation slugging vapor locking, freezing point, cold starting, flammability, availability, and combustion characteristics. For these reasons volatility or its A.S.T.M. distillation limits must be clearly defined.

Stability is the sixth general requirement for jet fuels and there can be no compromise on its requirements. This means that fuels must remain stable during some of the most unfavorable conditions of storage. These storage periods in remote areas may often run up to 2 years. In some of these out-of-the-way locations, fuel supplies are moved in once a year during flood stage of streams and rivers. It is not uncommon to find stocks in these places with storage time from 1 to 2 years.

The seventh requirement for jet fuel is odor. All jet fuels should have a satisfactory odor. A mercaptan content of 0.005 per cent is now allowed for JP-4 specification. The purpose is twofold, first odor, and second to prevent deterioration of the polysulfide type of synthetic rubber (thiakol) used in parts of present fuel systems by mercaptan sulfur compounds.

Military viewpoint . . . It seems logical at this point to consider some of the problems encountered by the military in the use of present jet-fuel specifications.

Current engine developmental work is primarily based on referee JP-4 fuel. However, in spite of this, the specification is known to be weak, due primarily to a lack of information concerning the composition, particularly back-end composition of planned wartime marginal jet fuels. It is true that it is not desirable to be continually effecting changes in fuel composition but in this case there appears to be no alternative. Therefore, it is felt that it is a prime responsibility of the military services and industry groups to develop as rapidly as feasible, a sound developmental referee-fuel specification. By balancing the design and availability factors, a realistic specification can be constructed.

Starting difficulties have been encountered in certain engines when using the low-volatility JP-4 fuel. However, a number of laboratory investigations have been made which indicate that low-temperature starting characteristics can be markedly influenced by combustor and ignition-system design.

The wide permissible gravity range of the JP-4 specification has been the subject of much adverse criticism from the standpoint of its effect on fuel-controller operation. These devices which govern and schedule the flow of fuel to the combustor contain no continuous adjusting mechanisms but instead are set to one average fuel density. Obviously, the operation of such single-setting controllers is sensitive to variations in viscosity and A.P.I. gravity; variations are further magnified by the changes in fuel temperature which occur during flight.

Although research directed toward alleviation of this problem is currently being conducted, no quick solution is forecast. Consequently, not only current service aircraft but also a considerable number yet to be produced will be affected by this control deficiency.

To minimize both the service operating problem and the amount of research effort facing the controller manufacturer, it is desirable that the gravity range specified be no greater than that required to insure ample availability.

The suggestion has been made that there be a number of referee fuels instead of one, since it must embody all minimum requirements and one fuel may not be able to do this.

Engine deposits . . . Deposits left on an engine from combustion are the most pressing fuel-related problem facing the services and engine manufacturers today in the design and operation of jet aircraft. Certain service engines have demonstrated decreased performance when operating on marginal JP-4 fuel. This is manifested by poor acceleration characteristics, uncertain ignition and spark-plug operation due to carbon accumulation in the dome areas, and decreased liner life caused by warpage resulting from uneven temperature profiles across the combustor liner when carbon deposits are present.

Since substantial numbers of these engines are already installed in planes in the aircraft programs of the Air Force and Navy, there is a question as to whether the propitious course of action is to undertake a costly time-consuming redesign of combustors or to amend the production JP-4 specification to alleviate the deposition problem. A major determinant is the logistical one, (i.e.) to what extent is the potential availability of JP-4 diminished by specification changes sufficient to permit satisfactory operation of the marginal engines?

Paraffins, olefins, and naphthenes, even those boiling up to and above the current 550° F. end point of the specification, do not appear to cause deposition problems. Sulfur also appears to have little effect. However, the multiring higher-boiling aromatics appear to markedly increase deposition. The degree of deposition is apparently a matter of molecular structure. As the aliphatic substitution increases, the deposition decreases, that is, in order of decreasing deposition tendency: benzene, toluene, ethyl benzene, propyl-benzene, etc. Therefore, for the long run, it appears that control of deposition through specification restriction of total aromatics and/or end point is not desirable since such restrictions also eliminate fuel constituents of excellent burning quality. Development of adequate tests of over-all hydrogen carbon composition and of heavy polymers is needed.

Stability in storage of jet fuels is a matter of primary importance and one for which an adequate test method is needed. A fuel that can be stored indefinitely without deterioration is the goal. Some stability tests are now being made, but no results have been made known as yet. A problem related to stability arises from the fact that, unlike other fuels, JP-4 cannot be downgraded or blended with motor gasoline or fuel oil; if JP-4 deteriorates in storage, it must, if it is to be utilized, be returned to a refinery, thus increasing the burden on refining and transportation facilities.

Other requirements . . . Present test methods do not accurately measure existing gum. It would be advantageous to know whether present engines could tolerate a higher gum content, both from the standpoint of possible increased availability and from the standpoint of utilizing fuel that has been stored for a sufficient period of time to allow for an increase in gum content.

An accurate vapor-pressure test for 2 to 3-lb. jet fuel is needed. Present test equipment is not adequate.

Some work has been done on the cloud point of jet fuels but this properly should be more seriously considered as a pertinent characteristic. The cloud point may be used to indicate the temperature at which serious interference with fuel flow is likely to occur.

In the jet-fuel specifications three inhibitors are listed that may be added separately or in combination to the fuel. These inhibitors are the same three as given in the aviation-gasoline specifications and are used because of satisfactory performance in aviation gasoline. However, investigation is under way to determine what type of inhibitors are best adapted to jet fuels.

A projection into the future in connection with proposed specification changes for jet fuels could be a possible relaxation of the —76° F. freezing point. This would mean a heavier and narrower-gravity-range jet fuel for heavy-type aircraft without sacrificing availability. However, this would require a great deal of study from the fuel availability and logistics standpoint. If other changes are made in JP-4 specification they will probably be concerned with A.P.I. gravity range, the 10 per cent distillation temperature, and the total aromatics content. Also aromatics boiling above 400° F. may be considered.

Aircraft Turbine-Fuel Supply Problems

by M. F. Granville*

THE wartime jet-fuel supply problem is essentially a matter of making available from the over-all pool of petroleum products the necessary quantities of fuel of the best possible quality that can be provided under emergency conditions.

When additional facilities are seen to be needed to provide the requisite amount of proper specification fuel, a plan is provided for accelerated tax amortization on the required investment. These programs are also supported by the allocation of the required materials.

Fuel specifications should be set as high as possible to aid in the development of turbine-driven aircraft, but at the same time, these specifications should be set realistically to insure adequate supply. Fuels used for peacetime development and operation of engineers must also gear into wartime availability.

JP-4 specifications . . . It is apparent that a rather wide range of fuel characteristics will fall within the limitation of JP-4 specifications. This is illustrated in Table 1.

In connection with Table 1 the following points are of most significance:

1. The majority of current JP-4 production east of the Rockies is 50° A.P.I. and higher while that from the West Coast is predominantly between 44° and 50° gravity.

2. Very little JP-4 production exceeds 230° F. at the 10 per cent evaporated point.

3. The low bromine numbers reflect the fact that currently JP-4 is predominantly produced from straightrun stocks. There are spot cases, however, where cracked materials run as high as 50 per cent, essentially all of which is thermally cracked stock.

JP-4 sources . . . JP-4 has been manufactured for and purchased by the military since January of this year. There are about 70 different points of manufacture, and the properties of the fuel vary widely. This is due to a number of factors, the most important of which are crude source and manufacturing procedure. As a result of the wide variation in crude characteristics and available refinery equipment, it is inevitable that such variations in jet-fuel characteristics will occur.

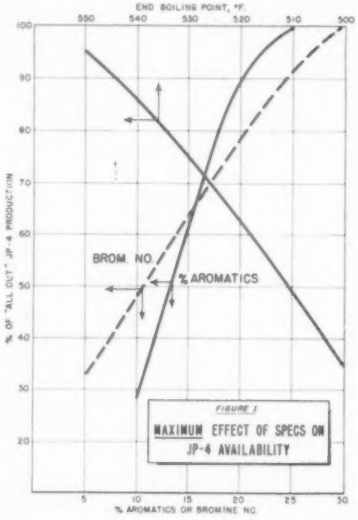
These variations would be even more pronounced in wartime. In wartime preparations must be made to produce maximum yields of jet fuel from individual refineries or from groups of refineries in any area. For this reason jet-fuel specifications must not be too restrictive.

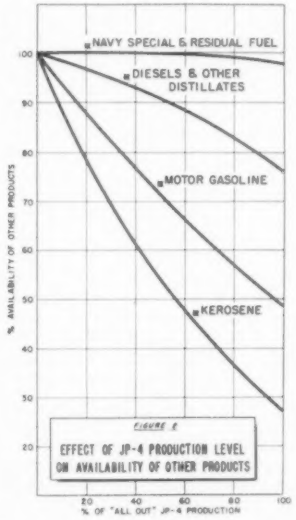
TABLE 1—REPRESENTATIVE PROCUREMENT FUELS VS. CURRENT JP-4 SPECS

	Current JP-4 specs	Current procurement JP-4
Gravity, °A.P.I.	40-58	42-55
R.v.p., psi.	2-3	2.1-3.0
10 per cent evap., °F.	250 max.	200-248
End point, °F.	550 max.	450-515
Aromatics, vol. per cent	25 max.	7.0-17.5
Total sulfur, weight per cent	0.4 max.	.01-.38
Bromine No.	30 max.	.1-5.0

Effect of spec changes . . . When considering the effect of various specification changes upon jet-fuel availability, it must be remembered that the nature of petroleum hydrocarbons is such that most specification points have an interrelation. For example, a reduction in total aromatic content would permit a narrower range in allowable specific gravity since a lower maximum aromatic content would lessen the contrast between fuels produced from the various crude sources. In fact, almost any specification change which tends to reduce availability will permit some further narrowing of other specification points without a corresponding further reduction in availability.

Fig. 1 shows the effect upon "availability" of three JP-4 specification points, namely, maximum aromatics content, maximum end boiling point,




NAVY SPECIAL & RESIDUAL FUEL
DIESELS & OTHER DISTILLATES
MOTOR GASOLINE
KEROSENE
% AVAILABILITY OF OTHER PRODUCTS
% OF "ALL OUT" JP-4 PRODUCTION
FIGURE 2
EFFECT OF JP-4 PRODUCTION LEVEL ON AVAILABILITY OF OTHER PRODUCTS

*Assistant director, refining division, PAD.

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and maximum bromine number. These curves show the "maximum" effect upon availability. They are based on discounting entire refinery output when that refinery cannot produce its present maximum yield of JP-4 fuel as a result of any proposed alteration to present specifications. In other words, these curves overemphasize the reduction in availability from specification changes. They are then useful in establishing outside or maximum effects.

Where more accurate estimates are required a detailed survey must be conducted of particular refining situations. Studies of this type were used in estimating the effect of going from JP-3 to JP-4, which included a reduction from 7 to 3 lb. maximum vapor pressure, elimination of the maximum 90 per cent point temperature, and reduction of the maximum final boiling point from 600° to 550° F. The combined effect of these changes was to reduce over-all jet-fuel availability by about 20 per cent. From these studies it is apparent that further reduction in maximum allowable vapor pressure cannot be tolerated.

Wartime fuels . . . Table 2 summarizes the major properties of JP-4 fuels under all-out wartime conditions. In connection with Table 2 the following points are most important:

TABLE 2—REPRESENTATIVE "ALL OUT" JP-4 FUELS

	Current JP-4 specs	"All out" JP-4
Gravity, °A.P.I.	40-58	44-57.5
R.v.p., psi.	2-3	2-3
10 per cent evap., °F.	250 max.	160-230
End point, °F.	550 max.	480-547
Aromatics, vol. per cent	25 max.	6.7-20.0
Total sulfur, weight per cent	0.4 max.	.04-.38
Bromine No.	30 max.	.8-30.0

1. Due to the relative demands for the various major petroleum products during wartime, including the effects of rationing, jet fuel should be of higher A.P.I. gravity.

2. This factor is reflected also by the lower temperatures of the 10 per cent evaporated point.

3. The range of bromine-number values is expected to widen very significantly under wartime conditions. The upper value is expected to approach the maximum allowed by present specifications, reflecting appreciable use of cracked stocks in jet fuels under wartime conditions. A comparison of present-day procurement fuels with maximum wartime production can be made from Tables 1 and 2. From these tables it can be seen that:

1. In wartime the average end point of jet fuels will be lower than in peacetime. The table is based on maximum possible production of jet fuel. Under wartime conditions the industry as a whole will not have to make maximum jet fuel.

2. Practically every fuel inspection will have a wider range of values in wartime as compared with today. For this reason, it is most desirable that the specifications of JP-4 be kept as wide as possible in order to permit maximum flexibility.

Other products . . . The effect of wartime production of JP-4 fuel upon the supplies of other petroleum products may be illustrated by Fig. 2. These plots show the relationship between the available supplies of four major petroleum products and the percentage of maximum United States JP-4 fuel production that wartime conditions may require.

The assumption was made here that production of aviation gasoline would be maximized, at all levels of jet fuel production, since this product is more difficult to manufacture than JP-4 fuel. It will be noted that the product which will be affected the most percentagewise is kerosine distillate. Wartime jet fuels will contain from 75 to 80 per cent of motor-gasoline (400° F.) boiling-range material and the remaining 20-25 per cent will be largely kerosine.

Therefore, while the bulk of this fuel volume will come out of gasoline components, there will be a substantial amount which will come out of kerosine distillate. There will be sufficient flexibility in wartime product distribution to split up available middle-distillate components according to the need for these products for essential uses.

In wartime, the greatest volume of nonessential product which can be diverted to essential uses is motor gasoline. It is therefore appropriate that wartime jet fuels be supplied at the expense of this product. The wartime product supply balances indicate continued operation of catalytic cracking units but that adjustments would be made to supply, in the best manner, feed stocks for alkylation plants and base stocks for aviation-gasoline blending.

It would probably be necessary in many cases to blend catalytic cracked gasoline and distillates into jet fuels. The use of thermally cracked gasoline is not likely to be important because such equipment will be largely shut down due to the need for large volumes of residual fuel in wartime.

It is thus apparent that in wartime the petroleum industry would, in a sense, have to go into reverse and figure out how best to "convert" motor gasoline into aviation gasoline, jet fuels, distillates, and residual fuels. It is further apparent that the degree of this situation would be such that distillates would be produced at minimum flash point, and residual fuels would be of much lower viscosity than normal.

Performance problems . . . There are a number of continuing performance problems related to jet-fuel quality and availability. These include (1) gravity, and gravity range, which are important for operational reasons, (2) front-end volatility, which may be important in altitude starting, (3) aromatic content, which effects burning quality and combustor deposits, and (4) boiling range, which may also affect burning quality.

PAD has recently advised the Armed Services that some specification changes were possible without significantly affecting availability. This advice was based on studies carried out by the Military Fuels Technical Advisory Committee. Specifically, suggestions have been made to (1) change the gravity range from 40°-58° A.P.I. to 44°-58° A.P.I., (2) lower the 10 per cent evaporated point from 250° F. maximum to 230° F. maximum, and (3) lower the maximum aromatic content from 25 per cent to 20 per cent.

One of the most pressing current problems seems to be that of combustor carbon deposits. This is largely a relative matter which assumes more importance as other turbine-engine problems are overcome. This problem, however, is also associated with the development of higher-output turbine engines. The effect of proposed alterations in fuel quality, designed to improve combustion and to alleviate related smoke and deposit problems, is currently being studied.

It will not be feasible in the present mobilization program to count on making any substantial additions or alterations to refining equipment designed, for example, to reduce jet-fuel aromatic content. Somewhere, short of this step, the problem must be solved by the engine manufacturers. At the same time it may later prove necessary and possible to tighten upon on present JP-4 specifications to make sure that current fuels, and if necessary wartime fuels, are equal in burning quality to the MIL F-5161-B prototype jet fuel now being used for engine-development work. This particular problem is now being studied by the Military Fuels Technical Advisory Committee.

Blending facilities needed . . . There is currently a large potential production

of jet fuel, but not enough refiners are equipped to blend jet fuel. More refiners, especially those in coastal areas, should install equipment to segregate naphtha and kerosine fractions for use in blending jet fuel.

Requirements for jet fuel have increased rapidly during the past year and are continuing to increase at a faster rate than any other military petroleum product. Current procurement by the military and by the engine manufacturers is approximately 100,000 bbl. per day, and it is evident that these requirements will continue to increase for some time to come.

Fueling Civil Aircraft

by J. Bennett Hill*

THE question as to whether the commercial airliner of the future will be turbine powered can be answered only "yes." Aside from the public's increased demand for speed and the glamor of jet-propelled aircraft, there is a still more realistic reason for this answer.

The development of any new engine of the size to power these planes is at enormous cost. There is not a large enough demand for these engines for commercial use to make such development attractive to the builders, and the trend, therefore, has been to purchase or adapt engines which have been developed for military purposes.

The military trend in these large engines is wholly toward turbine engines and, in fact, development of large reciprocating engines has practically stopped. If, therefore, we are to have further developments in commercial airliners, as of course we will, it will in all probability by via the turbine engine. For smaller craft piston engines will be made and used for a much longer time, although even here there is an interest experimentally in turbine engines.

The argument is still on as to whether turbine engines of the next 10 years will be turboprop or turbojet. Five years ago there was a rather general feeling that the turboprop would come first and possibly later the turbojet. In 1947, Gregory and Pomeroy made a valuable contribution to the thinking at the time by getting together a large number of opinions as to the changes in aircraft-engine power plants, and came up with the average opinion that by 1952, 12 per cent of the transport planes would be powered by turboprop and 3 per cent by turbojet, and that by 1957 41 per cent would be turboprop and 14 per cent turbojet.

The 1952 prediction has been by no means realized since there are no commercial turbine-powered planes flying yet in this country. The British are more advanced in this field, but their turbine-powered aircraft in actual commercial service are at present limited to a half-dozen deHavilland Comets powered by straight jet engines. These planes have cut the flying time from London to Johannesburg from about 28 hours to about 17 hours.

Within the next few months the British expect to put into service the turboprop Vickers Viscount, of which they have about 50 on order. The turboprop Bristol Brittania will be put in transatlantic service in 1954. Both turbojets and turboprops are being discussed by the airlines in the United States, and both will probably be used. The turbojet in airline thinking seems to be catching up on the turboprop.

Turbine fuels . . . Since both types of turbine engines will require about the same fuel, the question as to which comes first is of not much more than academic interest for the petroleum industry. The question for us is how much and when.

The total commercial use of aviation gasoline in the United States has grown from 7 million barrels in the first prewar year of 1946, to 16 million barrels in 1951, and an estimated 20 million barrels in 1952. Fig. 1 shows a fairly consistent rate of climb up to 1950, with an accelerated rate of climb in the last two years. The demand for fast travel is definitely on the up. Extrapolation of this curve on the assumption that reciprocating engines will still power our aircraft show requirements to be 28 million barrels in 1957, and 32 million barrels in 1962.

Jet-fuel requirements . . . The use of turbine-powered air transports by the airlines in this country will probably not be of any importance quantitatively in 1957. The problems of the airlines in making the shift are many. Even if they should decide to purchase already developed British planes, it is reported that the British manufacturers already have orders to carry them through 1954.

After planes are delivered the airlines will still have the problems of setting up operating and maintenance procedures, of integrating the faster planes into the traffic pattern of slower planes, and many others. There will, of course, be British and other foreign planes fueling in this country, but even at that an outside estimate of the amount of jet fuel is 4 per cent of the total aviation fuel.

For 1962 the opinions of the experts on probable jet-fuel consumption vary from 5 to 20 per cent of the avgas demand. A fair estimate is probably 15 per cent.

A jet-fuel demand of 1.1 million barrels in 1957 and 4.8 million barrels in 1962 may therefore be predicted. Conservative estimates of crude production in these 2 years are 2.6 billion barrels in 1957, and 2.8 billion barrels in 1962. The predicted jet-fuel demand on this basis is 0.04 per cent of our crude in 1957, and 0.17 per cent in 1962.

As compared with these figures, the railroad diesel-fuel consumption in 1951 was 57 million barrels. Kerosine consumption was 131 million barrels, while motor-gasoline usage was close to 1 billion barrels. Predicted jet-fuel demands, then, are certainly not too

(Continued on page 110)

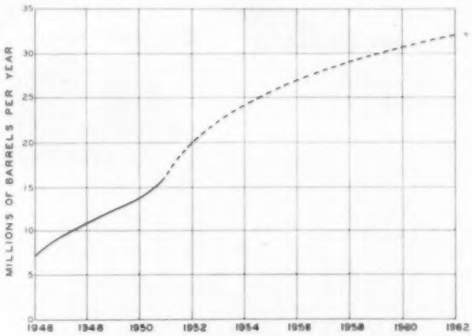
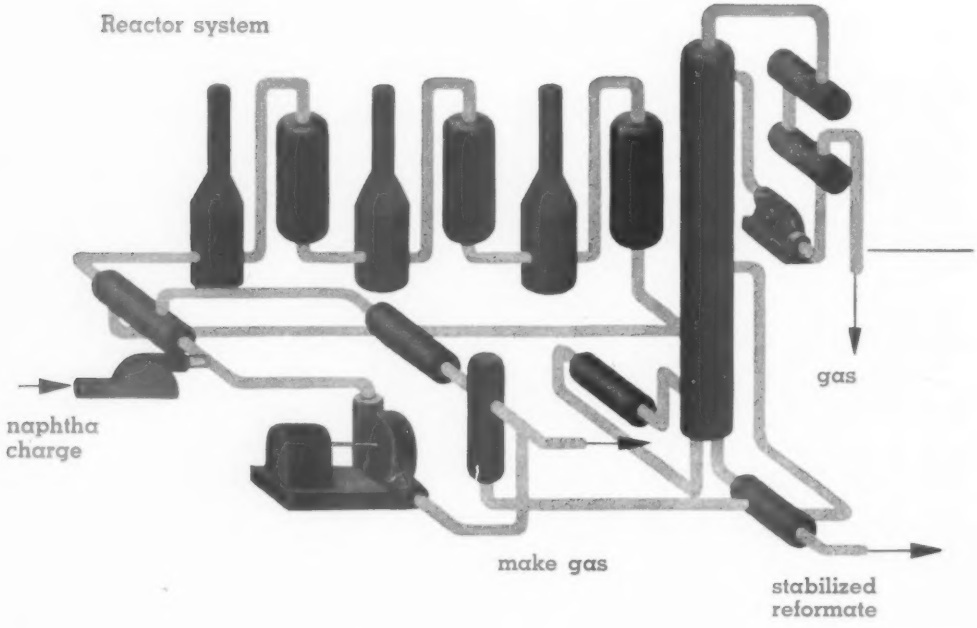
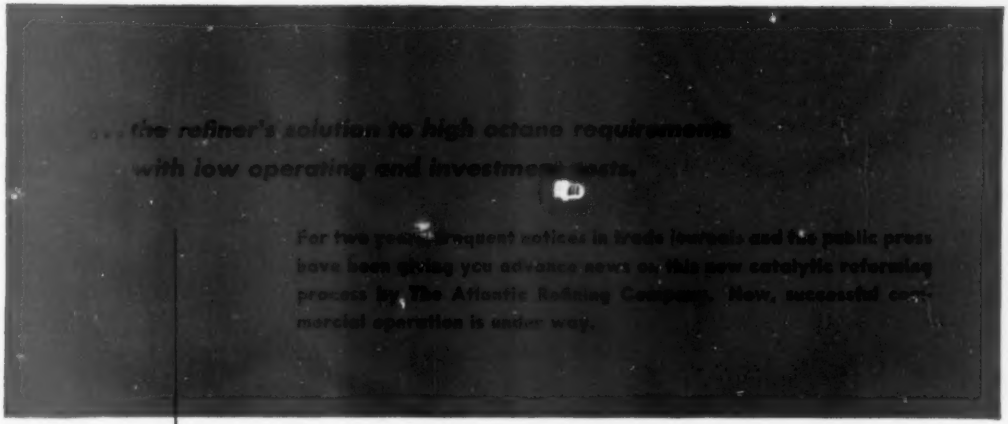


Fig. 1—Commercial aviation-gasoline consumption by years.

*Sun Oil Co., Marcus Hook, Pa.

the Atlantic catalytic reforming process





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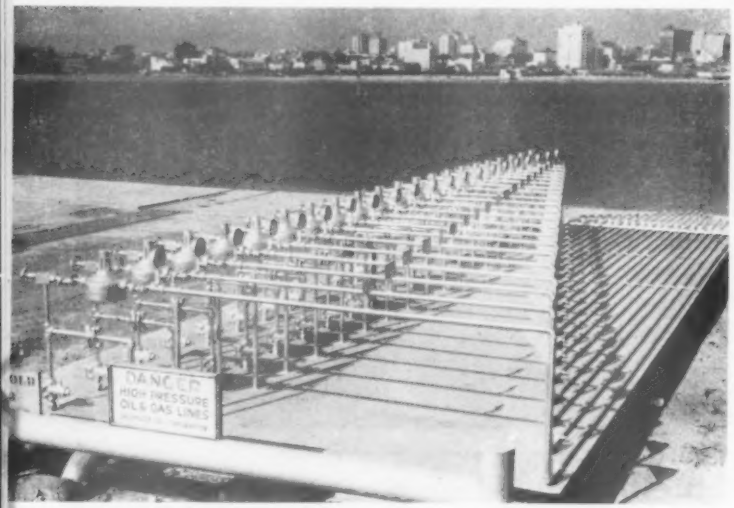
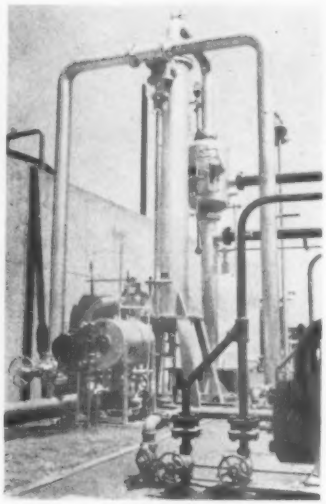
ATLANTIC



PUMPER'S PARADISE! (CALIFORNIA STYLE)... Unitized manifold for regulating and metering the amount of power oil which goes to each free-pumped well. At wells served by this manifold the power oil is kept separate from produced crude at all times.



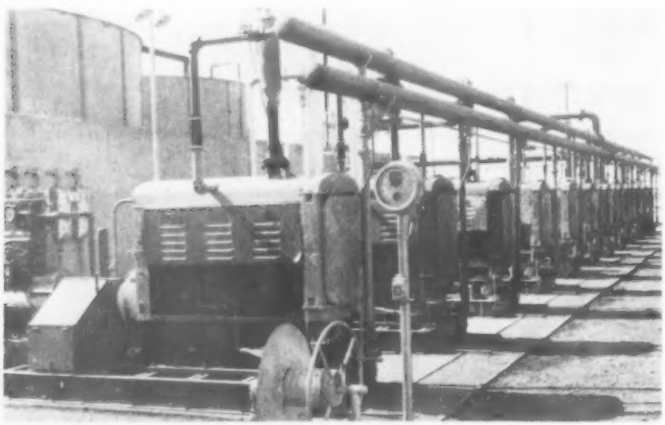
OIL-FIELD HEAT EXCHANGE... Steam leaves the cooling-water circuit in the elevated drum and passes down through the vertical shell-and-tube exchanger countercurrent to the rising power oil.

Richfield Innovations at Wilmington Field . . .

• New closed-system "free" pumps
• Waste engine heat utilized

by D. H. Stormont
West Coast District Editor

RICHFIELD OIL CORP.'s spectacular operation at Pier A in the Long Beach Harbor area of Wilmington field—where well-head equipment is in cellars and other producing facilities are so placed that as little as possible is visible from the bathing beaches ½ mile away—has two innovations not connected with the operation's scenic aspects. Both involve hydraulic pumps used to produce 62 of the 95 wells which have been directionally drilled from the pier.



VAPOR-PHASE COOLING... By means of the overhead manifolds boiling water is constantly circulated to all engines, eliminating the necessity for a warmup period following shutdowns.

In 50 of these free-pumped wells the power oil at all times is kept separate from the produced crude. This is accomplished through use of a third tubing string, which returns the power oil to the surface. In these closed-system units losses of power oil, through pump leakage, has averaged less than 2 per cent. The problem of making up large quantities of fresh power oil thus is eliminated.

The other point of unusual interest involves the two central plants supplying the power oil. Through heat interchange between the jacket water and power oil, waste engine heat is utilized to lower the viscosity of the power oil and thereby reduce the required operating pressure.

At one plant containing 12 triplex units, exchange of waste heat is carried out in a vertical exchanger. The multicylinder gas engines driving the pumps are equipped with a vapor-phase cooling system so that the benefits of high operating temperatures also are secured.

At the other plant, which contains

nine engines and pumps, heat exchange between boiler-produced steam and power oil is effected by coils in the power-oil storage tanks. These engines are scheduled to be converted to vapor phase cooling at a later date.

The submerged lease being produced by Richfield, which acts as contractor for the city of Long Beach, begins 600 ft. out from the 50 by 3,000-ft. strip from which the wells are drilled. All wells thus are slant holes. Some are slanted shoreward as much as 3,800 ft., with deviations up to 67° before tapping the oil pools which occur at subsea depths of 2,500 ft. and below.

The wells are equipped with either 8⅝-in. casing and 5½-in. liners or 9⅝-in. casing and 6⅝-in. liners. Pre-packed gravel liners were run in wells completed in the Ranger and upper Terminal zones; those completed in the lower Terminal have slotted liners. Except for a few with 3-in., 2½-in. tubing is used in all wells.

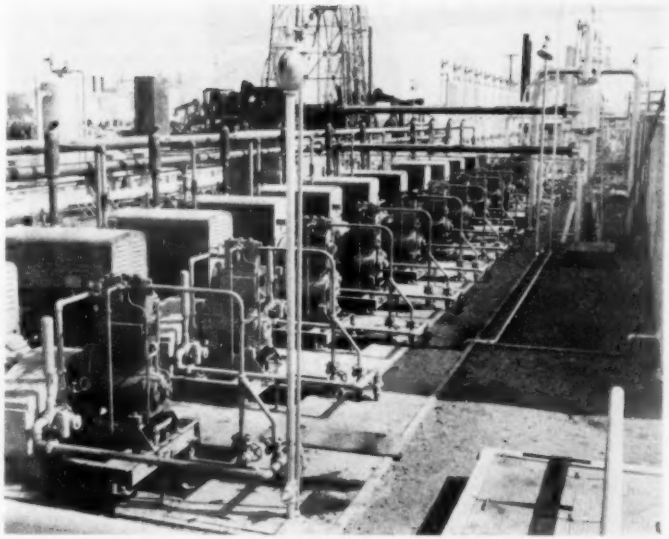
Conventional pumping units are installed on 12 low-volume wells and despite the hazards of operating rods in slant holes they have given highly satisfactory performance. Only two or three rod or tubing failures have been experienced in these wells during the past 4 years.

Closed-system pumping . . . Because of the slant-hole problem and inherent advantages of free pumps—plus the fact the latter can be placed underground and thus not be visible from the bathing beaches—use of conventional free pumps was adopted shortly after they became available.

After about 55 of the two-string pumps had been installed and power-oil requirements had increased to 11,000 bbl. daily, need for additional power-oil storage facilities arose. Adequate residence time to assure a clean supply of oil was not possible in existing facilities. The 14° to 25°-gravity crude, with a water cut averaging about 8 per cent, required a settling time of about 24 hours if an uncontaminated oil was to be secured.

In normal oil-field operations the problem would have been largely one of economics—the cost of adding extra tankage would be justified through improved operations. On congested Pier A space is at a premium and there was little room for adding to the two existing 2,000-bbl. power tanks.

Solution to Richfield's problem was the development by Kobe, Inc., of a closed-system free pump in which the power oil circulates entirely independent of the produced crude. A total of 50 of the new-type pumps have been installed at Pier A, all 2½-in. except for five 3-in. pumps.



POWER OIL, PLUS! . . . Battery of 12 engine-driven triplex pumps which supply about 10,000 bbl. of power oil daily to 47 free-pumped wells. The engines operate at 225° F. Vapor-phase cooling is utilized to heat the power oil to 130° F.

Operation of the units is the same as that of conventional dual-string free pumps except that the power oil is pumped down the 2½-in. tubing and is returned to the surface in a 1¼-in. string. Well fluid is produced by the pump through 1-in. tubing. Whenever it is desired to unseat and surface a pump, flow is reversed through the four-way valve so that the power oil exists through the 2½-in. tubing.

The central plant having 12 pumping units currently is supplying about 10,000 bbl. daily of power oil to 47 free-pumped wells. Adequate residence time now is available in the two 2,000-bbl. tanks since makeup requirements are only a fraction of what they once were. Any oil needed as makeup is automatically bled from the wash tank to the power-oil tanks through the action of a liquid-level controller in the power tank receiving exhaust power oil.

Because both conventional and closed-system free pumps are served by this central plant, it has been difficult to determine accurately just what the power-oil losses are in the closed units. Based on meter records of the inlet and return volumes of oil, however, it is believed losses in the closed-system pumps average less than 2 per cent.

Power oil is discharged from the battery of 12 triplex pumps at 1,800 to 2,000 psi. and at 3,000 psi. The oil then is carried in two 4-in. lines to

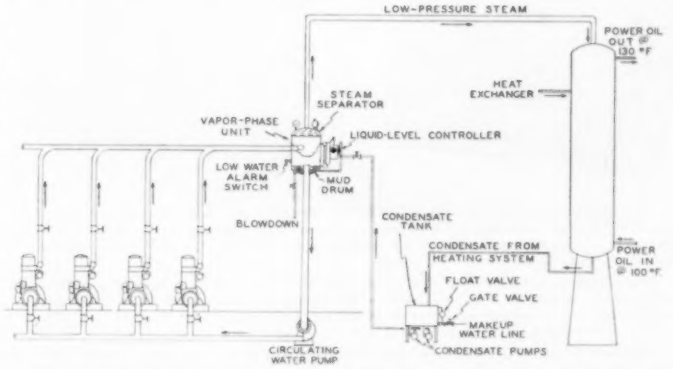


DIAGRAM . . . This illustrates how jacket-water and waste engine heat is utilized in the vertical exchanger for heating the power oil.

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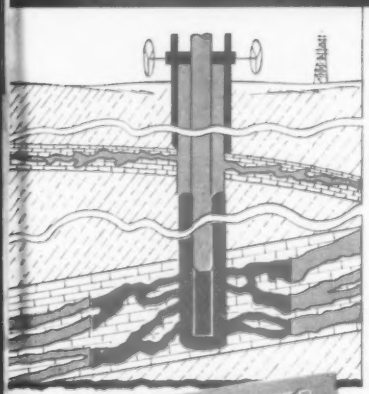

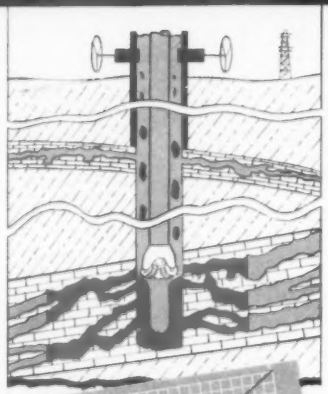

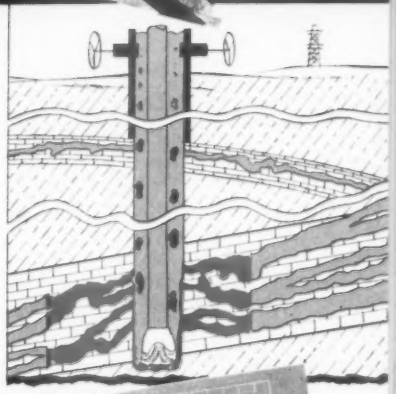

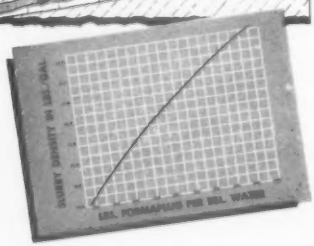

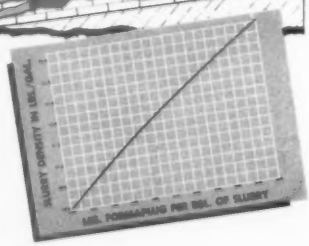

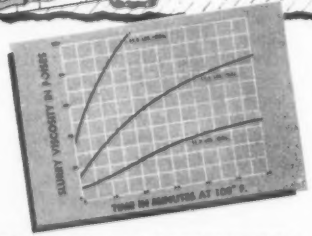

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The above diagrams show FormAplug being squeezed into a formation channel. Following placement of the slurry, the drill pipe is removed. After waiting a period for the FormAplug to develop strength, the FormAplug remaining in the hole is drilled out.

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unitized manifolds where controls regulate the volume going to each well. Meters incorporated in the manifolds register the inlet volume of oil to each well.

Flow of power oil and produced crude in the wells is as earlier stated. Aside from the metering of exhaust power oil, operation of the three-string units is the same as with conventional free pumps and thus will not be discussed.

The second central plant, consisting of nine engine-driven triplex pumps, is not operating at capacity in supplying 2,200 bbl. daily to nine free-pumped wells. All of these are of the triple-string type. Daily makeup of power oil for this system has been so small that it is considered negligible.

Waste-heat utilization . . . The recently completed vapor-phase cooling system installed at the 12-engine plant performs the added function of transferring waste engine heat to the power-oil system. Thus in addition to the benefits gained from high engine operating temperatures, the system makes possible a reduction in power-oil viscosity and attending lower pressure losses in the power-oil system.

The 45-hp. gas engines are operated at a jacket-water temperature of 225° F. and a crankcase lube-oil temperature of 180° F. Under these high-temperature conditions little condensation can occur in the cylinders and the cylinder walls are at a more uniform temperature throughout their length. Cylinder life thus is prolonged because of lessened corrosion and wear. Sludging and dilution of the lube oil likewise are reduced.

As is shown in the simplified diagram and photographs, inlet and discharge manifolds connect the cooling-water jackets of all engines. Unless isolated from the circuit for some reason or other, each engine receives a constant supply of hot water regardless of whether it is operating or idle. Whenever a shut-down engine is placed in operation there thus is no need for a warmup period.

Once the system is brought to operating temperature, boiling water is continuously supplied to all engines by a circulating water pump. In passing through the engines the water recovers all jacket heat, except that radiated, and approximately 50 per cent of the heat in the exhaust gases. Depending upon how heavily the engines are loaded, a portion of the water is converted to steam. Engine temperatures, however, remain uniform regardless of load, speed, or ambient air temperature.

Steam Cycle

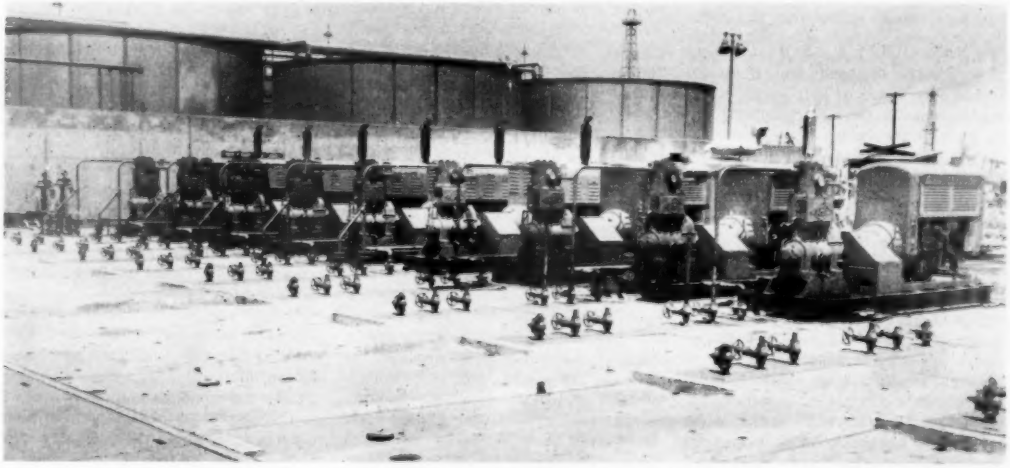
Steam vapor and any water not converted to steam in the engines feed into a discharge manifold which is connected to an elevated vapor-phase unit. In this unit steam at 2 to 3 psi. is separated from the water, passed through a steam separator and run to the vertical shell-and-tube exchanger.

The steam and water are tangentially introduced into the vapor-phase unit, creating a circulating motion which causes rust, mud, and scale to separate and fall into a mud drum. The debris-free water and steam condensate from the exchanger accumulate in the vessel and furnish constant feed to the circulating pump in the primary circuit. The condensate automtically is pumped from a condensate accumulator to the unit through the action of a liquid-level controller. Periodic blowdown purges the mud drum of any accumulated sediments.

Low-pressure steam from the drum passes to the top of the vertical exchanger. Power oil, at a temperature of 95° to 100° F., enters at the bottom and in passing through the tubes is heated to a discharge temperature of approximately 130° F. The heated oil then passes to a manifold from which the booster pumps of the triplex units take suction.

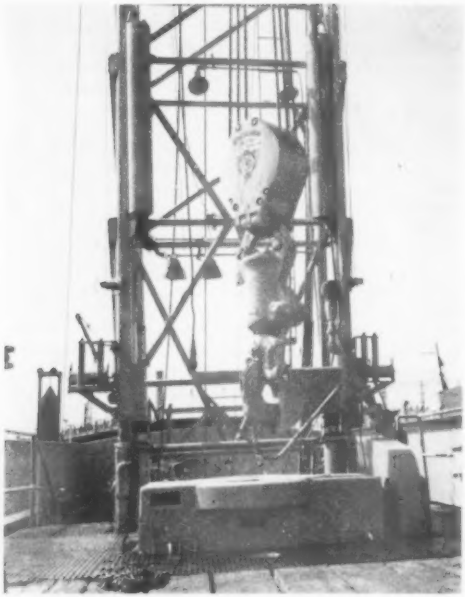
Steam condensate is removed from the bottom of the exchanger and accumulates in the small condensate tank. A small motordriven pump charges condensate back to the vapor-phase unit in response to the action of the liquid-level controller. Since the engines normally operate at a constant speed with little change in load, this pump operates continuously to supply the needed condensate for the primary cooling circuit. Any water not needed in the primary circuit bypasses through a water pressure relief valve back into the condensate tank.

Any time that the water supply in the primary circuit becomes too low, a float valve on the condensate tank opens to admit makeup water into the cooling system. Should makeup water not be admitted in response to the action of this control, a low-water switch on the vapor-phase unit automatically sounds an alarm and shuts down the engines. If the condensate pump should cease operating for any reason, a high-level float in the tank automatically switches on a standby pump.



CENTRAL POWER-OIL PLANT . . . Adequate provisions for expansion were included in this central plant, which serves nine free-pumped wells. This battery of engines shortly will be converted to vapor-phase cooling.

DRILLING BARGE of Texas Gulf Sulfur Co. is the first designed and built exclusively for sulfur exploration.



DRILL HOLE is in the center of the barge. Standard oil-well-drilling facilities are mounted on the barge.

New Drilling Barge for Sulfur Exploration

New equipment is scheduled for use in exploratory drilling operations in the salt domes located in shallow gulf waters

by Walter F. Rose
Gulf Coast District Editor

TEXAS GULF SULFUR CO. has recently designed and built the first drilling barge of its type for sulfur exploration. In the description of this barge as given below, the reader concerned principally with the drilling of oil and gas wells will find evidence that the problems encountered in sulfur drilling are singularly akin to those he confronts. The reader will conclude that the two industries will profit from exchange of information on the way their related problems are solved.

The Texas Gulf Sulfur Co. drilling barge here described is the first one which has been designed and built exclusively for sulfur exploration in areas where land-rig equipment cannot be employed. Heretofore, makeshift barge equipment has been employed which has been converted from oil-industry drilling rigs.

The accompany photos show the new drilling barge docked at Levingston Shipbuilding Co.'s Orange, Tex., yard where it was fabricated, and the barge later being towed to its first drilling site location in South Louisiana.

The drilling barge is 150 ft. long, 40 ft. wide, and 10 ft. deep at deck level. It has an 8-ft.-wide keyway slot which extends from the stern end 79 ft. down the middle, and therefore 4 ft. past the drill hole in the center of the barge.

A group of rooms and working spaces have been built in a U-shape on the forward portion of the barge. Separate space has been provided for welding equipment and tool storage; and for a change and shower room, a bunk room, an office, an oil and grease room, and a mud-mix room. These spaces are topped by an arched roof, which extends over the mud pump.

The barge is towed to a location, and firmly spotted by dropping four 16-in.-square wooden spuds. For the most part, drilling is done with the barge in a floating position, although there are provisions for sinking the barge (viz., operating it as a submersible-type drilling barge) should there be too much wave action or tide.

In the floating position, the barge is leveled by the operation of a ballast motor and pump, located under the pipe racks and connected to a ballast tank in each corner of the barge. The leveling is done by central control valves at the ballast pump.

All the motors have been adapted to use natural gas, butane, or gasoline. Butane is being used at present. Fuel is delivered by truck which is driven on to one of the auxiliary barges and towed to the drill site where it is transferred into three 1,150-gal. stationary butane storage tanks. These are located

under the pipe racks on the main deck.

Electrical power is provided by three 2-kw. light plants, and wiring is of conventional design.

Other features . . . A 47-ft.-long by 36-ft.-wide pipe rack is located 5 ft. above the main deck, and extends across the barge above the slot. A 5-ton, 30-ft. hoist boom loads and unloads pipe and other equipment.

To achieve maximum balance the drill hole is in the center of the barge (i.e., 75 ft. from the ends and 20 ft. from the sides). A Cardwell Trailerig mast is mounted on the barge. Power for drilling is provided by a GKU engine through a Twin Disc torque converter to a Model L Cardwell draw works and to the rotary.

When drilling is done with 4½-in. drill pipe the rig has a capacity to go to 6,000 ft. On the other hand, 10,000-ft. holes can be drilled with 3½-in. pipe.

The mud system has an 8 by 26-ft. mud-mix room, and a 10 by 5 by 4-ft. settling pit on a forward side of center. A 13 by 20-ft. 6-in. by 4-ft. deep reserve mud pit is located on each side of the slot and under the forward section of the pipe rack. There is a 6¾ by 12-in. mud pump powered by a WAK engine with a V-belt drive.

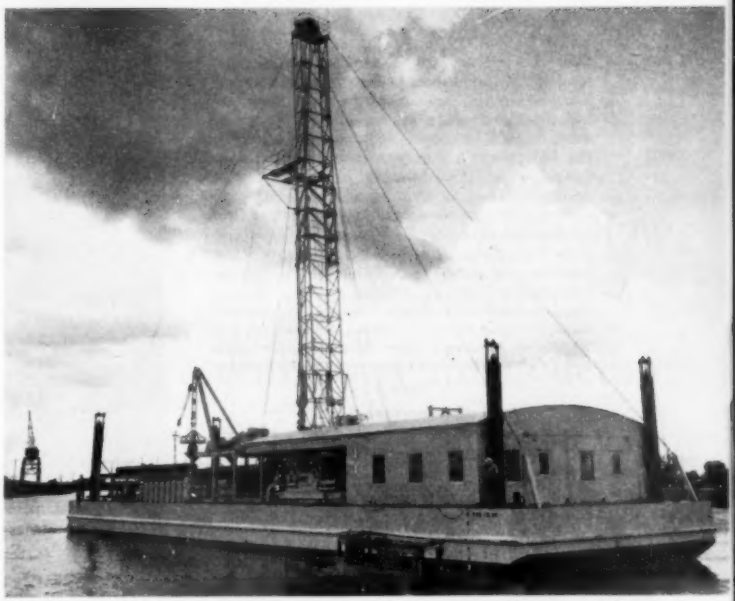
There are two bug-blower units driven by Ford V-8 industrial engines directly connected by a 6-ft. prop. Each of these discharges more than 100,000 cu. ft. per minute.

Three auxiliary barges have been built by Maxon Construction Co., Inc., Marine Division, Tell City, Ind., according to specifications furnished by Texas Gulf Sulfur, to haul water, fuel, mud, pipe, and other equipment to the drilling-barge location. Two of these barges are 100 by 26 ft. by 6 ft. 9 in. The other is 53 by 20 ft. by 5 ft. deep.

The barge will be manned by one driller, one assistant driller, two driller helpers, one mechanic and one supervisor. This personnel do not live on the barge, but will be housed ashore and commute back and forth by crew boats.

Sulfur Drilling Similar to Oil

There are many connections between the sulfur industry and the oil and gas industry. One incidental connection is seen in the form of the standard mineral lease which sets forth the right to explore for sulfur as well as oil and gas. More important connections arise from the similarities in methods of exploration and techniques of drilling employed in the two industries. And procedures now being employed to wash out caverns in underground salt and shale sections for the storage of gaseous and liquid hydrocarbons bear close resemblance to the Frasch process for sulfur production.



DRILLING OPERATIONS are usually conducted with barge in floating position. Provisions are also made for submersible-type operation.

Still another example of the way the sulfur and the oil and gas industries have become interconnected is the processing of so-called sour crude oil and sour gas to remove unwanted sulfur compounds and/or to recover elemental sulfur.

Sulfur exploration . . . Practically all of the elemental sulfur produced and used in this country since the turn of the century has come from deposits associated with the cap rock overlying certain salt domes. Moreover, the major sulfur production has come from the states of Texas and Louisiana, and in particular from about a dozen salt-dome accumulations. On the other hand, more than 200 salt domes are known to exist in four states bordering the Gulf of Mexico, and more than half of these have been locations for commercial oil and gas production.

The sulfur is usually found at depths of 500 to 1,500 ft. below the surface. Sinking shafts to mine such sulfur is not practical. The formations overlying the sulfur are unconsolidated sediments such as "gumbo," sand and clay, and this situation is responsible for the subsidence in areas where sulfur has been produced.

In exploring for new sulfur deposits, the general procedure therefore is to drill test holes with rotary-rig equipment similar to that employed by the petroleum industry for work in soft formations. When the salt dome cap rock is penetrated, cores are taken to see if any elemental sulfur is associated with the cap-rock limestone and calcite. Once a sulfur deposit of sufficient size is found by these means, the same or similar wells are later used for introducing the hot water and producing the molten sulfur according to the Frasch process.

Of the 14 commercial salt-dome accumulations of sulfur which have been found and exploited, 5 have been exhausted. This points to the need to continue to explore for new sulfur deposits, especially in this critical defense period when sulfur is in such short supply. And since many of the known salt domes are located in swamps, marshes, and bays bordering the Gulf of Mexico, exploratory drilling-barge equipment similar to that used in the oil industry is required.

Frasch process . . . Once commercial deposits of sulfur are discovered in salt domes, production is by the Frasch process. Two concentric pipes are installed in the hole, with the lower ends of the pipes extending into the sulfur-bearing strata. Hot water under pressure is forced into the annulus between the pipes. Sulfur is melted by the heat, and water and liquid sulfur are returned to the surface through the inner pipe.

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Fueling Civil Aircraft

(Continued from page 101)

large for the petroleum industry to handle, but should be considered in future planning.

Fuel quality . . . The next obvious question is what quality fuel will be required for commercial turbine aircraft. There is practically universal agreement that it will not be the same as the military fuel, as, for example, JP-4. The extent of the safety advantage of a high-flash fuel is still disputed, but probably the airlines will insist on a low-volatility fuel of the kerosine type, similar to JP-1.

For stability reasons it may be a straightrun fuel, and for combustion reasons it may be limited by excluding those crude sources which would give a very high aromatic content. On the other hand, there would seem to be no reason for commercial fuel to have the very low freezing point of —76° F. required for military fuels. This specification might very well come up to —40° F.

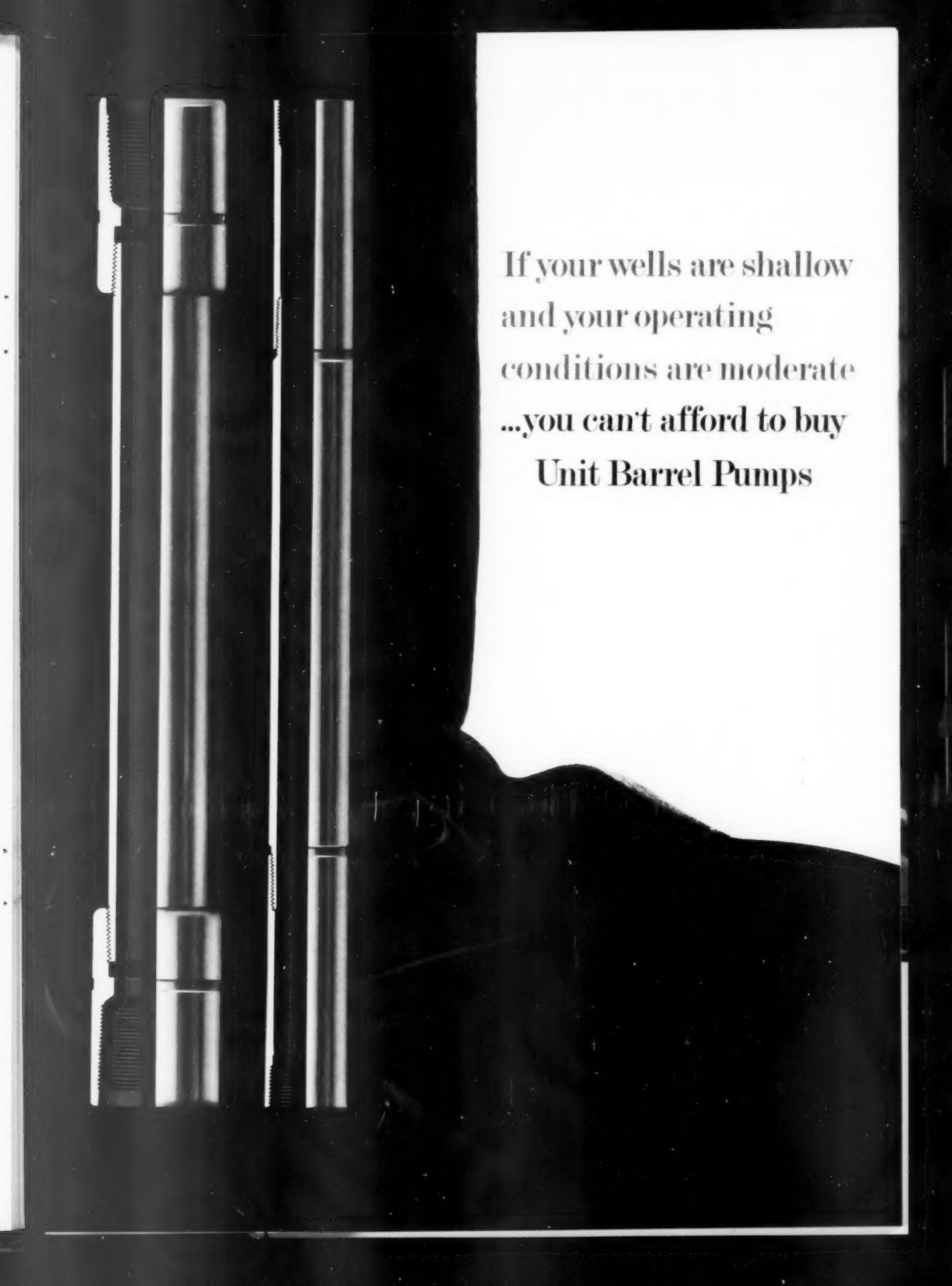
The present British commercial specification is probably not very far from what will be adopted. Typical British specifications are as follows:

Specific gravity (°A.P.I., approx. 39-48)	0.79-0.83
Heat of combustion, B.t.u./lb.	18,500
Freezing point, max. (—40° F.), °C.	—40
Flash point, min. (100° F.), °C.	38
Aromatics, max. by volume, per cent	20
Sulfur, max. by weight, per cent	0.2
Kinematic viscosity at 0° F., max., cs.	6

How fast the utilization of turbine engines by the airlines will grow will depend on the cost to them of the fuel. The cost will probably be of the order of kerosine or slightly above. It will probably find its level about 1 to 1.5 cents under regular-grade motor gasoline. It should be materially below any of the present grades of aviation gasoline.

As compared with current Gulf Coast prices of about 10 cents for kerosine, 11.5 cents for regular-grade motor gasoline, and 16.5 cents for Grade 100/130 aviation gasoline, the corresponding figure for jet fuel for commercial transports should be between 10 and 12 cents per gallon at the current prices, and probably closer to 10 cents. This is based on the assumption that the airlines do not hang on to many fancy specifications.

The day of jet fuel for commercial aircraft is coming, but not so fast or in such volume that the petroleum industry cannot take it in its stride.



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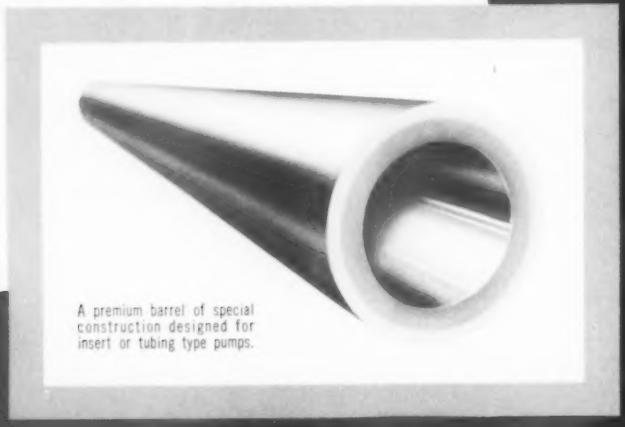

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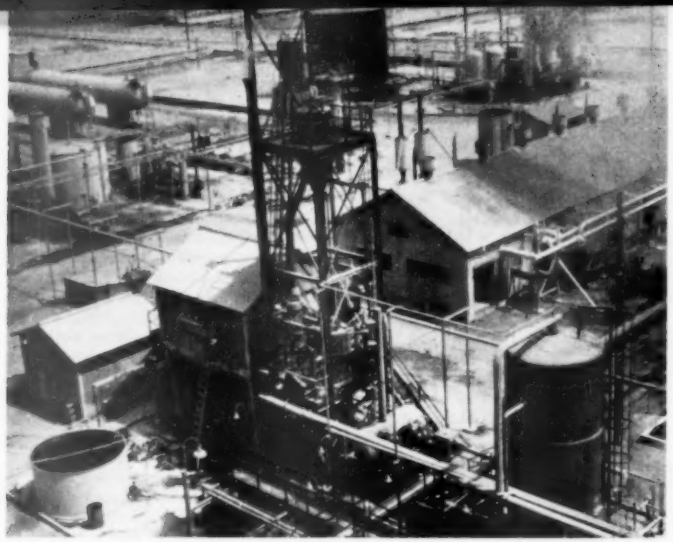


AMMONIUM SULFATE plant at Torrance refinery of General Petroleum Corp.

Production of Ammonium Sulfate From Refinery Waste

Waste acid sludge and ammonia, once problems in disposal, are now reacted to produce a profitable refinery byproduct

by E. D. Fox*

THE production of ammonium sulfate from refinery waste streams has become of considerable recent importance. This development results principally from the efforts of petroleum refiners to find suitable methods of disposing of refinery-waste acid sludge and ammonia without causing the atmospheric-pollution problem associated with disposal by burning or exhausting to atmosphere.

Manufacture of ammonium sulfate from refinery-waste acid sludge and ammonia has been satisfactorily worked out and put into practice on commercial scale by several refiners. The purpose of this paper is to outline the process used in one of these commercial installations and to describe the equipment and materials of construction required for a successful application.

Process Description

The process for manufacturing ammonium sulfate from waste acid sludge and ammonia varies only slightly from the conventional process using relatively pure sulfuric acid and ammonia. Essentially, ammonia is introduced into sulfuric acid with the resultant formation of ammonium sulfate. The ammonium sulfate is then separated by evaporative crystallization and filtration followed by drying. The available free sulfuric acid in acid sludge will react with ammonia as readily as pure sulfuric acid and therefore acid sludge may be used directly in the process without the necessity of first separating the acid phase from the oil phase. The source of ammonia required for the reaction may be either pure tank-car ammonia, or waste ammonia stripped from various refinery streams.

The process described in this paper has been developed by General Petroleum Corp. for application at its Torrance, Calif., refinery where both waste acid sludge and waste ammonia are available for the reaction. The flow diagram, Fig. 1, shows the equipment involved.

Ammonium sulfate formation . . . Acid sludge from various refining processes such as the sulfuric acid treatment of gasoline, stove oil, diesel fuel, etc., is collected in a common storage tank. The storage tank should be of ample size and be equipped with suitable agitation facilities for providing good mixing to give a uniform feed to the process. The acid sludge together with sour stripping steam containing the ammonia are introduced near the bottom of the reactor and flow upward through recycled ammonium sulfate mother liquor and oil from the sludge.

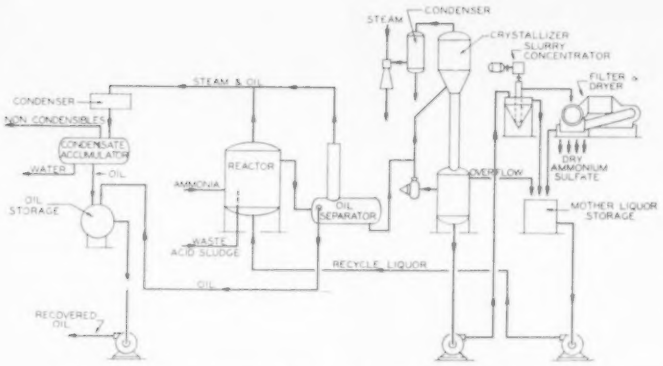
The ammonia-bearing stripping steam originates at a sour water stripper where various waste streams from the refinery units such as decokers, T.C.C. units, visbreakers, etc., are steam stripped of their contaminating hydrogen sulfide and ammonia before disposal. The ammonia in the stripping steam reacts with the acid in the sludge to form ammonium sulfate which together with the sludge oil and recycle mother liquor, rises to the top of the reactor from where it overflows to an oil separator.

Steam and hydrogen sulfide, free from ammonia, pass overhead out of the reactor to a condenser where the steam is condensed out and separated from the uncondensed hydrogen sulfide in a condensate accumulator. The condensate contains a small amount of absorbed hydrogen sulfide and is therefore recycled back to a sour water stripper for final treatment. The uncondensed hydrogen sulfide, along with other noncondensables, is drawn off and sent to another processing unit for subsequent catalytic conversion to sulfur in a Claus type sulfur-recovery plant.

A small amount of oil is also carried overhead and collects in the accumulator. This oil is drawn off batchwise and is fed to a storage tank where it is combined with the separated oil from the ammonium sulfate-oil separator. The reaction of sulfuric acid and ammonia to give ammonium sulfate is highly exothermic. In order fully to utilize the heat of reaction released in the reactor for the subsequent evaporation and crystallization process, cold mother liquor in sufficient quantity to absorb all the reaction heat is continuously recycled from the tail and ammonium sulfate filter to the reactor. The sole function of this recycle is to act as a heat carrier and, therefore, the recycle rate is fixed by the available heat of reaction.

Acid sludge and ammonia feed streams to the reactor are proportioned so as to maintain a sulfuric acid concentration of about 0.5 per cent in the ammonium sulfate liquor leaving the reactor. This concentration assures relatively complete utilization of the available ammonia and also promotes large crystal formation in the subsequent crystallization step. If a deficiency of either acid sludge or waste ammonia exists, the deficiency may be made up by adding either white acid or tank-

*The Fluor Corp., Los Angeles. Paper presented at A.S.M.E. Petroleum Division meeting, Kansas City, Mo., September 22-24.



FLOW SCHEME for recovery of ammonium sulfate from acid sludge—Fig. 1.

ear ammonia as required to bring the feed to the reactor into stoichiometric balance.

It is desirable to operate the reactor at about 7 psig., since by doing so, the ammonium sulfate liquor will flow from the reactor and through the separator into the crystallizer without intermediate pumping. At this pressure, the temperature of the ammonium sulfate solution, when nearly saturated, will be about 243° F. It is not advisable to operate at a much higher pressure and corresponding temperature since ammonium sulfate corrosion is greatly accelerated by increased temperature.

Oil separation . . . The mixture of ammonium sulfate liquor and oil continuously flows from the reactor overflow nozzle into a separator tank where sufficient residence time is provided to permit gravity separation of the oil phase from the ammonium sulfate liquor. The liquor, by virtue of its high specific gravity, readily settles to the bottom of the tank and the oil floats on top. An interface level controller maintains the liquor-oil interface and regulates the flow of ammonium sulfate liquor to the crystallizer.

Oil from the separator is discharged through a second level controller to a storage tank where it is combined with the distilled oil collected from the reactor overhead condensate. The combined oil streams collected in the storage tank are suitable for fuel oil. Since the oil is relatively free of sulfuric acid, it may be readily used as fuel without the resultant atmospheric pollution experienced from burning untreated acid sludge.

Some difficulty has been experienced in commercial practice with the separation and handling of the oil from very heavy acid sludges. This difficulty has been overcome by diluting with a light fuel oil. The dilution oil is added to the acid sludge feed at the reactor inlet. Other than making the separated oil more readily handled, no changes in the operating characteristics of the process are effected.

Crystallization . . . Ammonium sulfate liquor from the separator, at approximately 243° F., is introduced into an evaporative crystallizer where concentration and subsequent crystallization of the product ammonium sulfate takes place by evaporative cooling. It is of interest to note here that when the sulfuric acid concentration in the feed acid sludge to the reactor exceeds approximately 30 per cent, process variables such as reactor temperature, mother liquor concentration, recycle mother liquor to the reactor, and crystallizer temperature can be held within practical limits such that no additional evaporative heat is required at the crystallizer.

When operating under these conditions, the crystallizer will operate at approximately 150° F. and 3 psia. pressure. The vacuum is maintained in the crystallizer by controlled condensation of evaporated water in either a direct contact or surface condenser and a steam jet ejector for removing noncondensable gases. If the acid sludge feed concentration is not suitable for adiabatic operation of the process, then it is necessary that the crystallizer system be provided with a heater of adequate capacity for supplying the necessary heat of vaporization. It is good practice to provide a heater for control purposes even though the system will operate adiabatically. The crystallizer should be of a type that will permit optimum crystal growth and classification in order to facilitate subsequent filtration, drying, and product handling.

Filtration . . . Finished crystals are pumped from the crystallizer in slurry form to a filter. An intervening slurry concentrator may be used to reduce the liquid load on the filter, but is not absolutely necessary. The filter may be of any conventional design; however, ammonium sulfate crystals when crystallized under the proper conditions, are most economically handled in a centrifugal type filter. The perforated basket-type centrifuge has been very successfully used for this service. Liquor from the filter drains into a mother liquor tank from which it is pumped back to the reactor as recycle. The recycle is supplemented as required with saturated liquor from the crystallizer.

Drying . . . The ammonium sulfate cake from the filtration operation is then dried. Since ammonium sulfate decomposes on excessive application of heat, it is the usual practice to dry the crystals in one of the conventional hot-air dryers. Successful application of a combined centrifuge and hot-air drier has recently been experienced for this service in a commercial installation. It is necessary that the moisture content of the dried crystals be kept below 0.12 per cent in order to prevent difficulties with caking during handling and storage. It is usual practice to dry to approximately between 0.05 and 0.08 per cent moisture.

Product handling . . . Dried ammonium sulfate is conveyed from the drier to either loading or storage facilities. Any of the conventional conveyors are suitable for handling the product. Pneumatic conveyors have proven very satisfactory in this service where adequate precautions are taken to keep moisture out of the system. Ammonium sulfate is used almost entirely as fertilizer and therefore sales are highly seasonal, consequently, large storage facilities are usually required. Bulk storage facilities are usually provided as they are more economical than package storage facilities. Product ammonium sulfate is sold in either bulk or customary 100-lb. bags.

Material of construction . . . All process streams are corrosive in nature and therefore careful consideration must be exercised in selecting the materials of construction.

Type 316 stainless steel has proven satisfactory in ammonium sulfate handling and satisfactory service may be anticipated in the use of this alloy for all vessels, process equipment, and piping involved. When using chromium nickel steels in this corrosive service, however, it is important to remember that they are subject to carbide precipitation under certain conditions on the application of heat. Welding produces these conditions and past experience has shown that if proper welding techniques and heat treatment are not adhered to,

corrosion difficulties will be encountered.

Carbon steel has proved satisfactory for handling of acid sludge and may be used for storage vessels, pumps, and piping in this service. The stainless steels are somewhat more corrosion resistant, but since the oil in the acid sludge apparently inhibits attack from the contained acid to a considerable degree, and corrosion of carbon steel is not severe, it is doubtful whether or not they could be economically justified for this service. Carbon steel is also satisfactory for the reactor overhead condenser, condensate accumulator, and associated piping and pumps. However, no brass, bronze, or other copper-bearing alloys should be used in this service when hydrogen sulfide is present as they would readily be attacked.

Equipment

General Petroleum has installed and successfully operated for more than a year, a 12-ton per day plant using the process described. The plant is designed to operate with an acid-sludge feed stock containing about 41 per cent sulfuric acid, 14 per cent water, and 45 per cent oil. The ammonia feed is a foul steam containing about 2 per cent ammonia, 2 per cent hydrogen sulfide, and the rest water vapor. Design and construction of the plant was handled by Fluor Corp. in close cooperation with General Petroleum who furnished all research and pilot-plant data for the process. The equipment installed in the General Petroleum plant is described in the following and is more or less typical for this kind of installation.

Reactor . . . The reactor is a vertical vessel with a height-to-diameter ratio of 2:1 and having approximately 10,000 gal. liquid volume plus several feet of free space for vapor disentrainment. The large liquid volume is provided to allow for sufficient reaction time and to minimize the effect of variations in feed stream composition and quantity with the end result of holding the composition of the reactor product stream constant. Of particular significance in this respect is the control of acid concentration, since this variable has a marked effect on subsequent crystal formation and over-all plant recovery.

High acid concentration also results in accelerated corrosion throughout the plant. Both acid sludge and recycle liquor are introduced through separate nozzles located in and near the center of the bottom head. The acid-sludge nozzle projects a short distance inside the vessel so that fresh acid sludge feed is discharged away from the vessel wall and is flushed upwards by the recycle liquor. The result is that corrosion resulting from high acid concentration is practically eliminated. Inspection of the reactor after more than 1 year of service shows that no apparent corrosion has taken place except at the terminal end of the sludge inlet pipe. Corrosion at this point has been rather severe but is of little consequence since the inlet pipe is easily replaced.

The ammonia-bearing steam is introduced through four nozzles equally spaced around the circumference of the vessel and located a short distance above the bottom. No special provisions are included for distributing or mixing the steam since sufficient agitation is provided by the thermal circulation resulting from the chemical reaction. Product liquor, oil, and recycle liquor leave the reactor through a single overflow nozzle located a few feet from the top head.

Stripped steam, hydrogen sulfide, and other noncondensables are discharged through a nozzle in the top head. The reactor operating pressure is controlled by a back-pressure regulator on the steam outlet. Liquid flows to the reactor are metered with rotameters and sour steam with an orifice meter. No other instrument controls are provided. Proper concentrations are maintained in the reactor by hand control of the various streams. Convenient sample points are provided on the reactor for routine testing.

The reactor overhead condensers are open-type cooling-tower sections followed by a condensate accumulator fitted with a level controller for continuous drawoff. Any oil that is vaporized and carried overhead collects on top of the water and is drawn off batchwise as required. Uncondensed hydrogen sulfide and other gases flow continuously from the accumulator for subsequent processing.

Oil separator . . . The ammonium sulfate liquor-oil separator following the reactor is a small diameter horizontal vessel designed to give about one-half hour residence time for separation of the two liquid phases. The ammonium sulfate liquor settles to the bottom and the oil floats on top. The vessel is provided with an interface level controller for regulating the continuous drawoff of liquor and a second level controller for regulating the oil flow. In order to take advantage of the available pressure due to the static head of the liquid in the reactor, the oil-level controller is located on a standpipe installed on top of the separator and extending above the reactor liquid level.

The oil level is maintained at the same height in the standpipe as the reactor liquid level. With this construction, a small-diameter, horizontal separator having a relatively large interface for the separation can be used and the advantages of utilizing all the available static pressure and keeping the separator near grade level for ease of operation are still maintained.

Crystallizer . . . The crystallizer is a Struthers Wells Krystal Crystallizer. This type crystallizer has a vaporizing chamber where excess water is flashed off, and a crystal suspension container which holds the saturated liquor and ammonium sulfate crystals. The vaporizing section is connected to the suspension container by a barometric leg and circulating line fitted with a pump. The vaporizing section operates at about 3 psia. and the suspension container remains at atmospheric pressure.

Ammonium sulfate liquor from the oil separator is introduced into the crystallizer circulating line where it mixes with recirculated liquor from the suspension container before being introduced into the vaporizer. The circulating line is fitted with a steam heater which supplies any additional required heat for the subsequent vaporization. When the feed liquor is at the proper temperature and concentration, this heater is not required; however, it is convenient for control purposes and plant startup.

The liquor passes into the vaporizer where excess water flashes off by virtue of the reduced pressure and then flows down the barometric leg to the suspension container where ammonium sulfate crystallizes out. Crystal size is largely regulated by the circulation rate. Water removed in the vaporizer is condensed in a water-cooled surface condenser and noncondensable gases are removed by a single steam-jet ejector.

Centrifuge and dryer . . . The centrifuge is a Baker Perkins "ter Meer" continuous centrifugal and drier combined. The centrifuge consists primarily of a horizontally disposed shaft with a perforated cylindrical basket on one end. The basket is covered with a screen which holds the crystals but permits the liquor to pass through. The shaft is hollow and accommodates a hydraulically operated pusher which reciprocates back and forth in the basket. The basket rotates at about 1,600 r.p.m. The crystal slurry is introduced at the shaft end of the basket and the solids collected on the screen are advanced along the basket towards the open end by the pusher.

As the crystals move along the screen, they are given a water wash before final dehydration. The washed and centrifuged crystals fall from the basket into a dry housing where they are intimately contacted with heated air which dries them to about 0.05 per cent moisture, and then out through a solids discharge

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to a product hopper. The drying air is heated by indirect contact with hot oil in an externally located heater and is circulated into the drying chamber by means of a small blower.

Storage facilities . . . Storage facilities consist of a 5-ton-capacity hopper located below the centrifuge and a 30-ton concrete storage bin located several hundred feet from the plant. The 5-ton hopper is equipped with a motor-driven rotary valve and functions as feed storage for a pressure-type pneumatic conveying system which transfers the product to the 30-ton storage bin. The pneumatic conveyor consists of a positive-displacement air blower located at the storage bin, conveying pipe, return air pipe, dust filter, and a cyclone-type receiver equipped with a bag filter.

Crystals fed to the conveyor by the rotary valve are conveyed by circulating air from the blower through the conveying pipe to the receiver where they are discharged into the storage bin. The conveying air is returned to the suction of the blower after passing through the dust filter. The storage bin is so designed that trucks can be driven under and gravity loaded without additional handling.

Pumps . . . There are only three pumps operating in ammonium sulfate service. These are the crystallizer circulating pump, centrifuge slurry feed pump, and filter to reactor recycle pump. They are all motor-driven, low-head, centrifugal pumps. The crystallizer circulating pump is fabricated from type 316 stainless steel and the other two pumps are Worthite.

Additional pumps are required for handling the feed sludge to reactor, separator oil discharge and reactor overhead condensate return. These are all simplex, double acting, steam driven reciprocating pumps and are of cast iron and mild steel construction with stainless steel fittings.

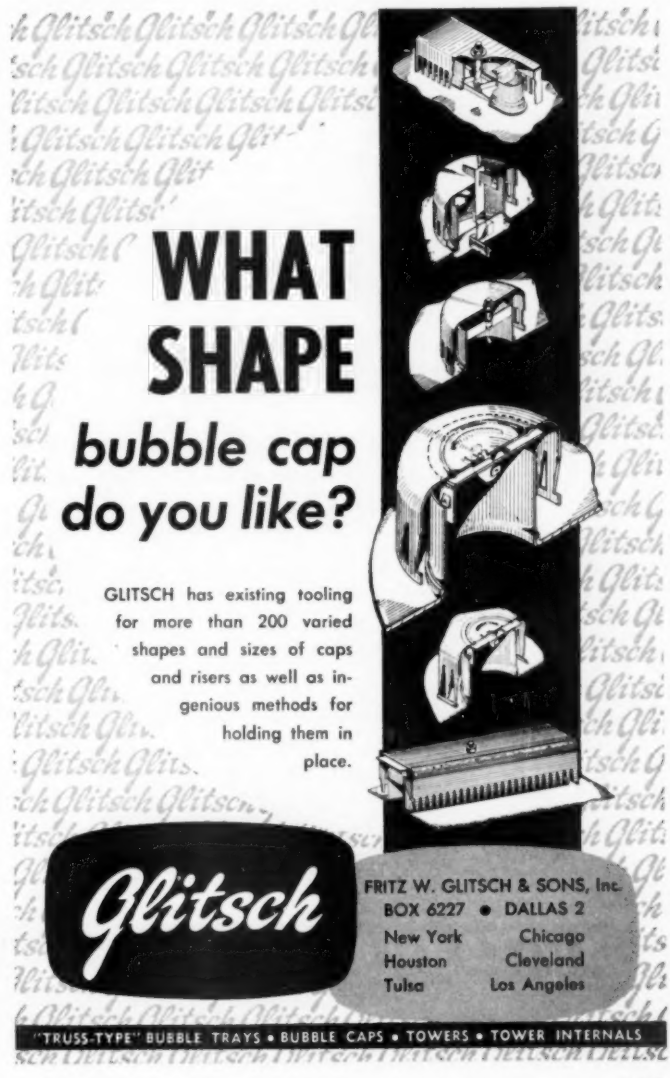
Piping . . . Piping is conventional for refinery piping except that connections for flushing water are supplied to all lines where clogging from crystal formation can take place. Since clogging is apt to take place whenever operations become upset, it also is good design to provide flange connections at frequent intervals for ease of removal and cleaning.

Economic Considerations

The process described in the preceding not only has the advantage of eliminating a disposal problem confronting many refiners, but also converts formerly wasted materials to usable products thus helping to conserve our natural resources. At the same time, the refiner is presented with a new source of revenue. Not only is salable ammonium sulfate amounting to 2,500 lb. per ton of 100 per cent sulfuric acid (based on 95 per cent recovery) produced, but also the oil present in the sludge is recovered.

The ammonium sulfate has a market value of about $45 per ton, carload basis, f.o.b. works, and the oil will have a minimum value equivalent to plant fuel oil. The characteristics of the recovered oil will, of course, be dependent on the refinery crude charge stock. In some cases, oils having higher values may be isolated if the separation costs are not excessive and a market is available.

In cases where byproduct ammonia, originating from catalytic refining of high-nitrogen crudes, is not available, tank-car ammonia at about $75 per ton can be used. Five hundred and fifteen pounds of anhydrous ammonia will be required per ton of ammonium sulfate produced, making the raw material cost about $19 per ton. Utility costs are nominal since only a small amount of power is required for the low-head pumps and the product-handling equipment. Some cooling medium is required for condensing the reactor and crystallizer overhead, and some fuel is required for providing the necessary heating for product drying.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Exploration in Nova Scotia

Geophysical surveys increase interest in province as potential oil country

by Richard A. Pohly

Fig. 1—Place fix map of Antigonish area, Nova Scotia.

THE peninsula of Nova Scotia is getting its share of consideration as the petroleum industry continues its constantly expanding search for new producing areas.

The little that is known about the subsurface geology of Nova Scotia indicates that favorable conditions for the accumulation of hydrocarbons in substantial quantities exist. The types of rocks that are generally considered essential for the generation of petroleum (bituminous shales and limestones) are present within the Pennsylvanian and Mississippian rock section of Nova Scotia.

Any oil companies interested in the development possibilities of the province can secure complete information about the surface geology and a copy of the S.S.C. report by writing to the Honorable Wilfred T. Dauphinee, Minister of Trade and Industry, Halifax, N. S.

Fig. 2—Map of surface geology of the Antigonish area after map prepared by Dr. D. J. MacNeil, consulting geologist, Antigonish, N. S.

Though there are no known active oil seeps in Nova Scotia, evidences of their former existence have been found in the eastern part of the province. Shows of natural gas were recently encountered in a core hole in the Antigonish area.

The sedimentary section is several thousand feet thick over large areas of Nova Scotia and includes many highly porous beds of limestones and sandstones. Reef limestones, similar to those productive in Illinois and Ontario, are exposed in outcrops. Both surface geological surveys and geophysical work (gravity meter and magnetometer) have shown the existence of sharp folds and faults and a gravity survey has indicated the presence of at least one salt dome and several reefs.

General Geology

It is the Carboniferous (Mississippian and Pennsylvanian) rocks that offer potentialities for oil or gas production in Nova Scotia. Pre-Mississippian strata are too highly altered to be considered potential oil traps. These Carboniferous rocks are for most part continental in origin, having been deposited in fresh water. There was, however, a marine invasion of the area toward the end of Mississippian time.

Historical . . . Though marine waters covered parts of Nova Scotia at various times during the early part of the Paleozoic era, the rocks developed in these waters cannot be considered potential oil reservoirs because a revolution occurring at the end of Devonian time probably destroyed whatever porosity and indigenous hydrocarbons may have existed in these old rocks.

Subsequent to this revolution, continental sediments were deposited in many parts of the province. These sediments, called the Horton series reached thicknesses of 5,000 ft.

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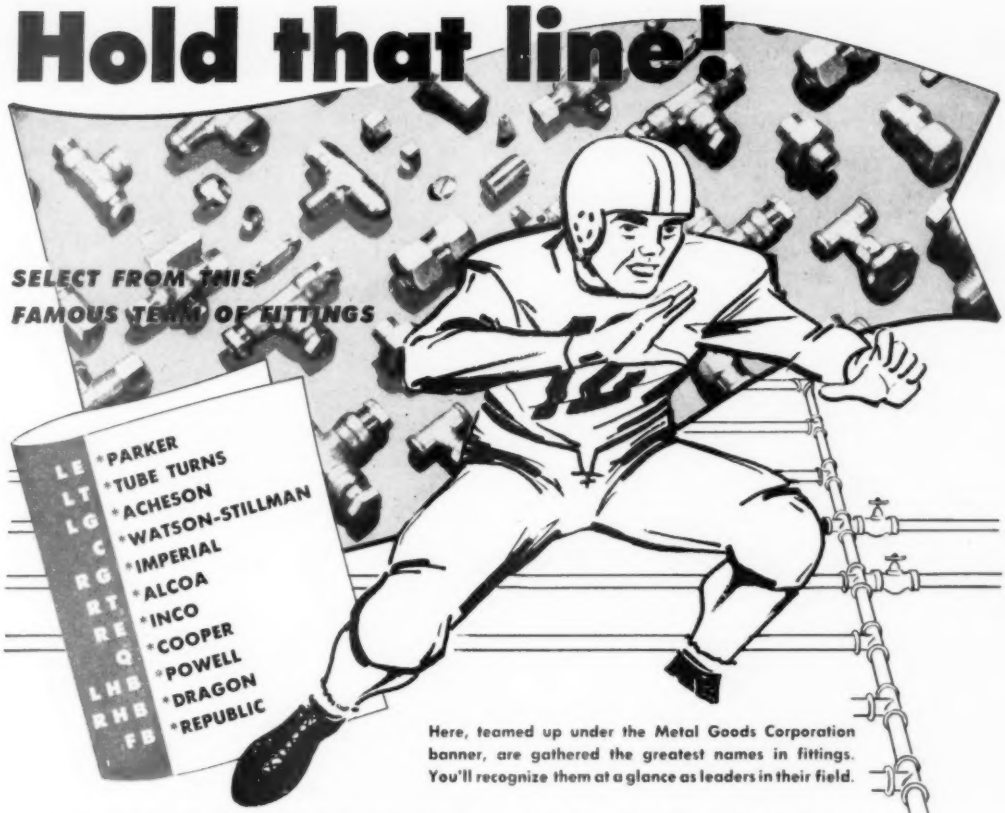

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Fig. 3—Residual gravity map of the Antigonish area.

Fig. 4—Vertical magnetic map of the Antigonish area.

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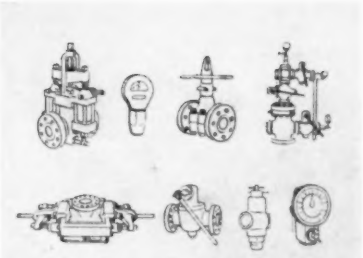

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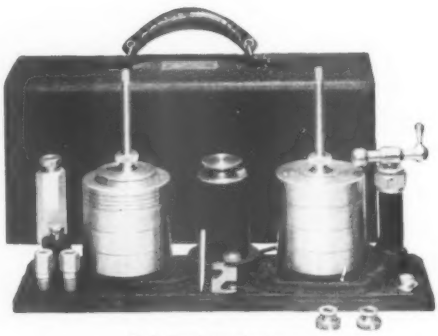

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THE AUTHOR

Richard A. Pohly majored in electrical engineering at Albion College and University of Michigan. This training was later augmented by extension courses in geology and geophysics from Pennsylvania State College and University of Texas. In 1937 he was employed by Shell Oil Co. for geophysical research work. Since 1941 Pohly has been engaged exclusively in gravity work with contract geophysical companies. In 1946, he organized Global Exploration Co. and served as general manager. In 1950, he organized a gravity division for Seismograph Service Corp., and is now serving as manager of that division.

locally. In some areas this predominantly conglomerate sequence carries seams of black oil shale underlying several hundred feet of sandstone and sandy shale.

Toward the end of Mississippian time the sea spread over Nova Scotia between the remnants of the hills that had been cut down during Horton time. The sediments deposited by these seas are known as the Windsor series. They are made up of thick beds of red shale, limestone, and evaporites. In places the salt and gypsum zone is many hundreds of feet thick and may reach a thickness of 6,000 ft. locally.

In some areas the Mississippian marine section is overlain by Pennsylvanian continental beds. These Pennsylvanian rocks are believed to reach thicknesses of 20,000 ft. and consist of sandstone, shale, and coal. Locally the Mississippian and Pennsylvanian are conformable through transitional strata called the Canso group, but at other places there is a marked unconformity.

Antigonish area . . . The west half of the Antigonish quadrangle (see Fig. 1) lies along the axis of a narrow and deep basin of sedimentation. The sedimentary rocks found in this area are Carboniferous and Ordovician in age. The former lie in various attitudes, but in all cases are only slightly indurated or metamorphosed despite some violent warping and deformation. The Ordovician rocks are well metamorphosed and in some placed well silicified and baked.

Early in the Mississippian period, tectonic activity 15 to 20 miles west of the mapped area (see Fig. 2) uplifted the Pictou-Antigonish highlands. This uplifted area served as a source area of coarse clastic materials which were swept eastward, building a large fan of Horton beds. Sediments were also washed northward from the Buysboro highland.

Instability along the seaward margin of these fans caused shales and a thin limestone to be interfingered with the more usual arkoses and sandstones of the Horton group. In late Horton times, the Crystal Creek fault began its movement. This faulting caused a depression of the area due to the tilting of a large block of Ordovician metamorphosed sediments, allowing the Windsor seas to advance. The seas deposited a sequence of siltstones, limestones, gypsum and salt. Reemergence of the area relative to sea level followed. The transitional Canso group of shales and sandstones and the fluviatile Pennsylvanian beds were laid down.

In late Pennsylvanian time, or early post-Pennsylvanian, the block now covered by the Antigonish Harbor was faulted and it reacted similarly to the Ordovician block. It was at this time that the currently recognized structures came into existence.

The main structures of the area include two en echelon anticlines, both of which are associated with faults. Crossing between them, forming an S-shaped pattern, is a syncline which swings between the plunging anticline and resumes its synclinal appearance as the Pomquet syncline (see Fig. 2).

Geophysical Surveys

Seismograph Service Corp. recently completed gravity-meter and magnetometer surveys in the west half of the Antigonish quadrangle for the Province of Nova Scotia. The surveys were conducted in an area located along the south side of the Antigonish Harbor. The area assigned for the surveys consisted of a strip approximately 4 miles wide and 15 miles long, extending from northeast to southwest.

Interpretation of Data

The interpretation of the gravity and magnetic data accumulated during the survey is, of necessity, largely qualitative. It would be possible to make it more quantitative and compute depths to basement, thickness of salt sections, etc., but that treatment would require the use of assumed densities which are not considered justified by the information at hand. Moreover, the limited extent of the survey and the effects of varying thicknesses of weathered material overlying the bedrock could produce very misleading solutions to the problems of depths and thicknesses.

Magnetometer . . . This exploratory tool is most useful in outlining igneous intrusives and variations in the total thickness of sedimentary beds. Sharp local increases in magnetic intensity normally indicate local increases in the thickness of igneous intrusives at shallow depth. Broad magnetic maxima of low intensity are usually indicative of ridges in the top of the pre-Cambrian. Few structures in the sedimentary beds have interpretable magnetic anomalies because of the low magnetic susceptibility of sedimentary rocks. Exceptions would occur where a bed with a high magnetic content was affected by folding or faulting. It has also been noted that locally thick salt beds, and particularly piercement-type salt domes, are generally accompanied by minor magnetic minima.

Gravity meter . . . The gravity survey is affected by local changes in density. Hence any change in rock densities in a horizontal plane at any place between the surface and the center of the earth will produce a gravity anomaly. The width of the anomaly and the steepness of the gradient on the flank can be interpreted in terms of depth where single anomalies occur. In practice, however, adjacent anomalies overlap and distort each other to such an extent that definite depth determination is impossible. The gravity interpretation thus becomes a matter of properly evaluating the amount of overlap and accounting for each anomaly in terms of probable structure. It is for this reason that a geologist with an intimate knowledge of an area can frequently improve upon the geophysicist's interpretation.

Residual gravity map . . . The "smooth contour" method for constructing residuals has been used on this map (Fig. 4). This method consists of carefully estimating the normal regional gravity gradient for the area and superimposing those contours on the observed gravity. The differences are then derived by subtraction and the residual contoured on these differences.

The limited area covered by this survey does not provide enough regional gravity positively to establish a definite regional gradient. The anomalies shown on this residual could, therefore, be considerably altered by a more extensive survey, and in the interpretation which follows the most importance has been attached to the strong local anomalies which would be least affected by any change in the evaluation of the regional gradient.

Interpretation of Maps

On the magnetic map (Fig. 1) it will be noted that three intense mag-

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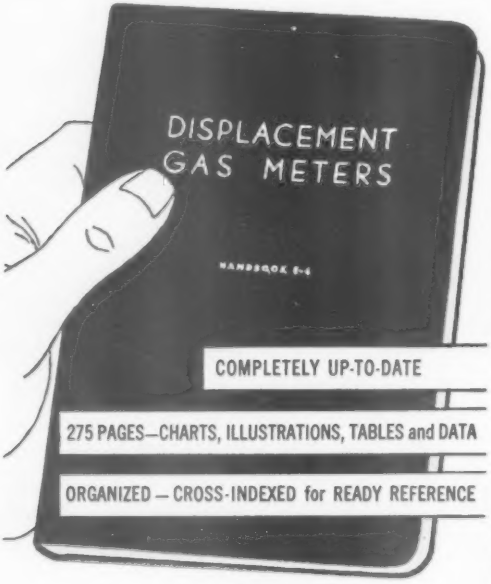

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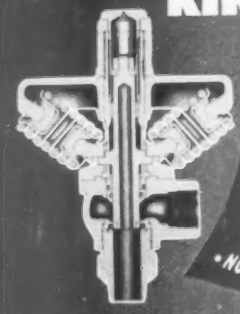

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netic maxima form a trend along the east side of Antigonish Harbor.

The most intense anomaly is centered at A. It is located between two exposures of granite and would probably have shown better correlation with those exposures if additional stations had been extended on to the northeast. The anomaly centered B coincides with a granodiorite exposure. This anomaly is considered to be an expression of the intrusive body making up these exposures. On this basis, the magnetic anomalies would indicate an extension to the south with the granite lying near the surface at C.

An extension eastward from the most northerly anomaly would suggest that a buried spur of the intrusive might extend out to D. The gravity residual has a maximum which correlates well with these magnetic maxima, and the gravity anomalies along this trend are considered to be primarily related to the intrusive body. The magnetic maximum centered at E also appears to represent shallow granite.

The maximum nose in the extreme southwestern portion of the magnetic map, extending to F, is probably indicative of a ridge in the top of the pre-Cambrian. This is further confirmed by the elongate gravity maximum which has its crest along the anticline indicated on the residual map (Fig. 4), starting at G and extending northeastward. The gravity anomaly would indicate a pronounced fold along this axis, and the low-intensity magnetic maximum would indicate that at least a portion of the anticline coincided with a basement high. The very steep gradient along the western edge of this anomaly would indicate a very sharp flank on the side of this fold.

A syncline is indicated on the gravity residual map, extending from H to I. The gravity minimum along this trend coincides with a magnetic minimum and would appear to indicate that the structure is related to a trough in the granite. However, the steepness of the flanks of the anomaly would indicate that the structure carries well up into the sedimentary beds.

Two gravity maxima, situated north and east of Antigonish, have been combined as a trend on the residual. The fact that no pronounced magnetic anomalies are associated with these gravity features would indicate that the density change must occur in the sedimentary section. The flanks of the anomalies are steep and would indicate a relatively shallow density contrast. The similarity of these anomalies to those encountered over the Niagaran bioherms of Ontario would strongly suggest reef development. Whether reefs would be probable in the area would be a question to be referred to the geologist.

At J, K, L, and P, on the map we have a series of four residual gravity maxima. These features resemble the reefs described in the previous paragraph and are interpreted as such. Their alignment does suggest an anticline, but the saddling of the gravity between the anomalies and the very steep gradient on the flanks would favor the reef interpretation.

The only gravity minimum which can be reliably interpreted as salt effect is that centered at M. The intensity of the anomaly would be too great to indicate a normal thickening of the salt, and it is considered probable that it should be indicative of a small piercement-type salt dome.

At N there is a very sharp reduction in the gravity which suggests salt effect. Additional stations to the northeast would be required to define this feature.

Conclusions

The anomalies discussed in the previous paragraphs would appear highly favorable for the accumulation of hydrocarbons. The flanks of the salt dome at M should offer a good pros-

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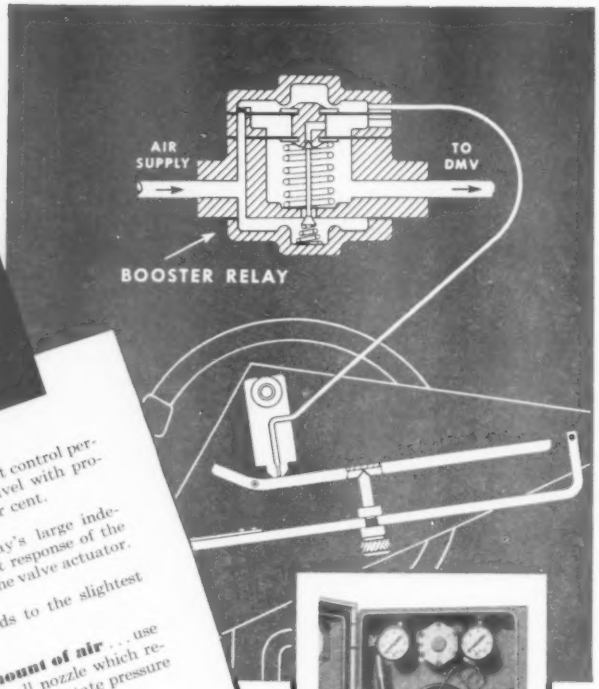

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pect for drilling, since gas is known to occur in that immediate area. The selection of locations would depend upon the positions of the most productive beds around or over the dome, and should, therefore, be a problem for the geologist.

The selection of drilling sites on the reef anomalies would be less difficult, and it would be recommended that the wells be located as near to the center of the residual anomaly as possible.

The anticline in the southwest portion of the map should also be investigated for oil possibilities. A location southwest of Gaspereaux Lake, at G, would appear to be the most favorable. However, if drilling on the structure is contemplated, gravity and magnetic work should be extended at least 5 miles to the southwest for regional control.

Another possibility for the accumulation of hydrocarbons would appear to exist along the flank of the intrusive granites if porosities are reduced in the metamorphosed beds. This, however, would be a problem for the geologist, rather than the geophysicist.

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BOOKS

THE OIL RECORD, 1952 EDITION. Published by Petroleum Industry Projects, 1420 New York Avenue, N.W., Washington 5; compiled under the direction of Henry Ozanne. $6.00.

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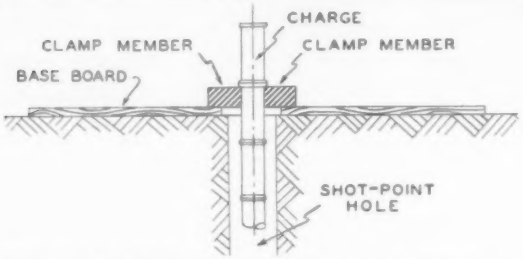
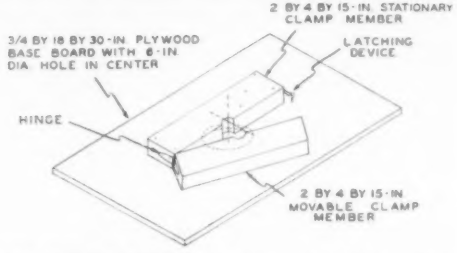


PORTABLE LOADING DEVICE for use where large dynamite charges are required permits loading in the field over the shot hole.


2 BY 4 BY 15-IN. STATIONARY CLAMP MEMBER
3/4 BY 18 BY 30-IN. PLYWOOD BASE BOARD WITH 6-IN. DIA. HOLE IN CENTER
LATCHING DEVICE
HINGE
2 BY 4 BY 15-IN MOVABLE CLAMP MEMBER

HINGED SUPPORT DETAIL explains construction of clamp member on base board; charge is placed over center of clamp member.

Seismic Shooting

Improved methods include hinged support for resting dynamite at shot-point well head; better cable splicing

TWO new methods of practical application in field operations recently employed by seismograph crews are (1) a hinged support for resting dynamite charges at shot-point well head, and (2) improved technique for splicing geophone cables.

Hinged support . . . When shooting or preloading shot holes in an area where large dynamite charges are required, a home-made type loading device can be used to facilitate this operation.

This device should be constructed of wood or of some nonsparking material as a safety precaution.

This hinged support is placed over the shot-hole as shown in an accompanying drawing. This arrangement would allow the first section of the charge to be lowered into the hole and locked in the clamp. Thus the remainder of the charge may be added without having to support the weight of the entire charge.

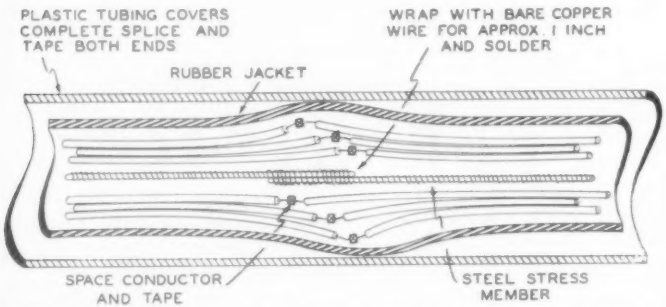
This method of loading holes will not only increase shot-hole efficiency but will eliminate back strain to which shooters and loaders are particularly subjected.

Splicing geophone cables . . . The use of bronze couplings and cable grips is eliminated through a new technique of using the cable stress member for strengthening the cable splice.

The steel stress member is cut and overlapped approximately 1 in. Then it is wrapped with bare copper wire and soldered. All tension is placed on the stress member thus eliminating any pull on the jacket and conductors of the cable.

After completion of splice, a plastic tubing is placed over the joint and taped at both ends, thus reducing the possibility of the splice catching on rocks, brush, and the like. Breakage of conductors is minimized by this method and lost time in the field from this cause is reduced.

Acknowledgment is made to Phillips Petroleum Co., Bartlesville, Okla. for the data for this report.


PLASTIC TUBING COVERS COMPLETE SPLICE AND TAPE BOTH ENDS
WRAP WITH BARE COPPER WIRE FOR APPROX. 1 INCH AND SOLDER
RUBBER JACKET
SPACE CONDUCTOR AND TAPE
STEEL STRESS MEMBER

IMPROVED SPLICING technique for Geophone cables uses the cable stress member for strengthening the cable splice as shown in the above transverse section.

Cheap, Convenient Water Supply Available for Rigs

Portable air-compressor equipment is used in air-lifting water wells to furnish a water supply to drilling rigs. Viersen & Cochran, Okmulgee, Okla., drilling contractors, set up this particular compressor water-well installation immediately adjacent to the drilling location.

The water well is drilled by driving a screen-mesh-type "sand point" coupled on the bottom of the tubing string. Then a string of macaroni pipe is swung above sand-point.

At the surface, a tee is mounted horizontally on the water lead line. A heavy-duty air hose is connected from the well to the portable compressor unit.

Quick dismantling . . . When the drilling operation is completed, the portable compressor unit can be moved quickly to another location by means of the trailer mounting. The sand point and tubing can be pulled out of the ground by the use of heavy jacks.

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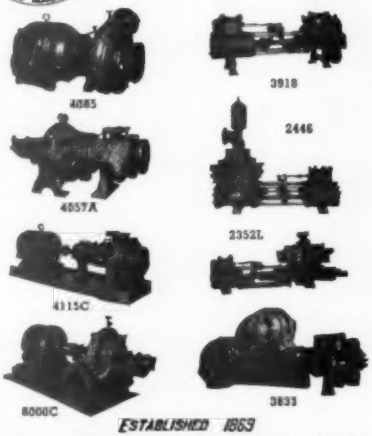

ESTABLISHED 1869

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AN EXPLOSIMETER is used by L. D. Sharp to test the discharge end of the air-mover to detect the presence of hydrocarbon vapors. After discharge air shows zero reading, the inside of the tank is then tested with the same instrument.

New Air Mover Frees Tank Cars of Vapors

TIME required for removal of gasoline or L.P.G. vapors from tank cars has been cut from 16 hours to 1 hour by Lone Star Gas Co. by means of a compressed-air type ventilating unit on the bottom outlet, and a simple air deflector supported in the dome of the tank car.

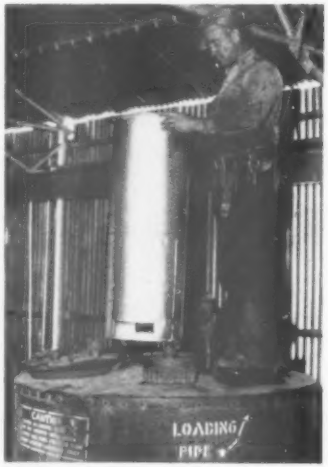
Equipment setup . . . The suction end of an Air-Mover, the ventilating unit, is connected through an adapter to the bottom outlet of a tank car and is aimed in the direction of wind movement. For best results, air pressure of 80 psi. is supplied to the Air-Mover. However, it may also be used at pressures as low as 40 psi.

The deflector is a 14½-in.-diameter sheet-metal cylinder 41 in. long with a 17½-in.-diameter supporting flange on top that rests on the tank-dome opening. The bottom end is closed and two 3 by 8-in. openings in opposite sides of the deflector's walls provide means of directing entering air toward opposite ends of the tank. The deflector is simple to make.

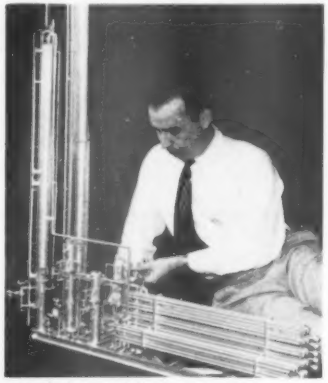
Safety measures . . . After 20 minutes of operation, and at 5-minute intervals thereafter, an M.S.A. Explosimeter is used to detect the presence of hydrocarbon vapors in the exhaust air. Checks are taken until a zero reading is obtained. Usually 30 minutes of operation is enough for an 8,000-gal. tank. The instrument is then used inside the tank. Although traces of gas are rarely found, if detected the deflector is replaced and ventilation resumed. Sometimes, scale holds vapors. In such cases the scale must be removed, especially if welding or other hot work is to be carried out.

Lone Star Gas Co.'s experience shows that no liquid products should be left in a tank when starting to remove vapors. If any liquid remains after draining, it is flushed out with water.

This method of vapor removal from tanks is the result of experimentation by G. M. Covington, safety engineer, and N. E. Landers, superintendent, of Lone Star Gas Co.'s tank-car shop at Ranger, Tex. A. W. Breeland, assistant director of personnel in charge of safety, and J. M. Kindle, superintendent of the gasoline department of the company and its subsidiary, Lone Star Producing Co., authorized the experimental work. Use of a 3-in. M.S.A.-Lamb Air-Mover for the job was suggested by J. W. Emery, Ethyl Corp.



AIR DEFLECTOR for the dome of the tank car shown above is turned so that the two 3 by 8-in. openings at the bottom direct air flow into both ends of the tank. Flange at top supports deflector on dome opening.



Model Highlights Plant Design Features

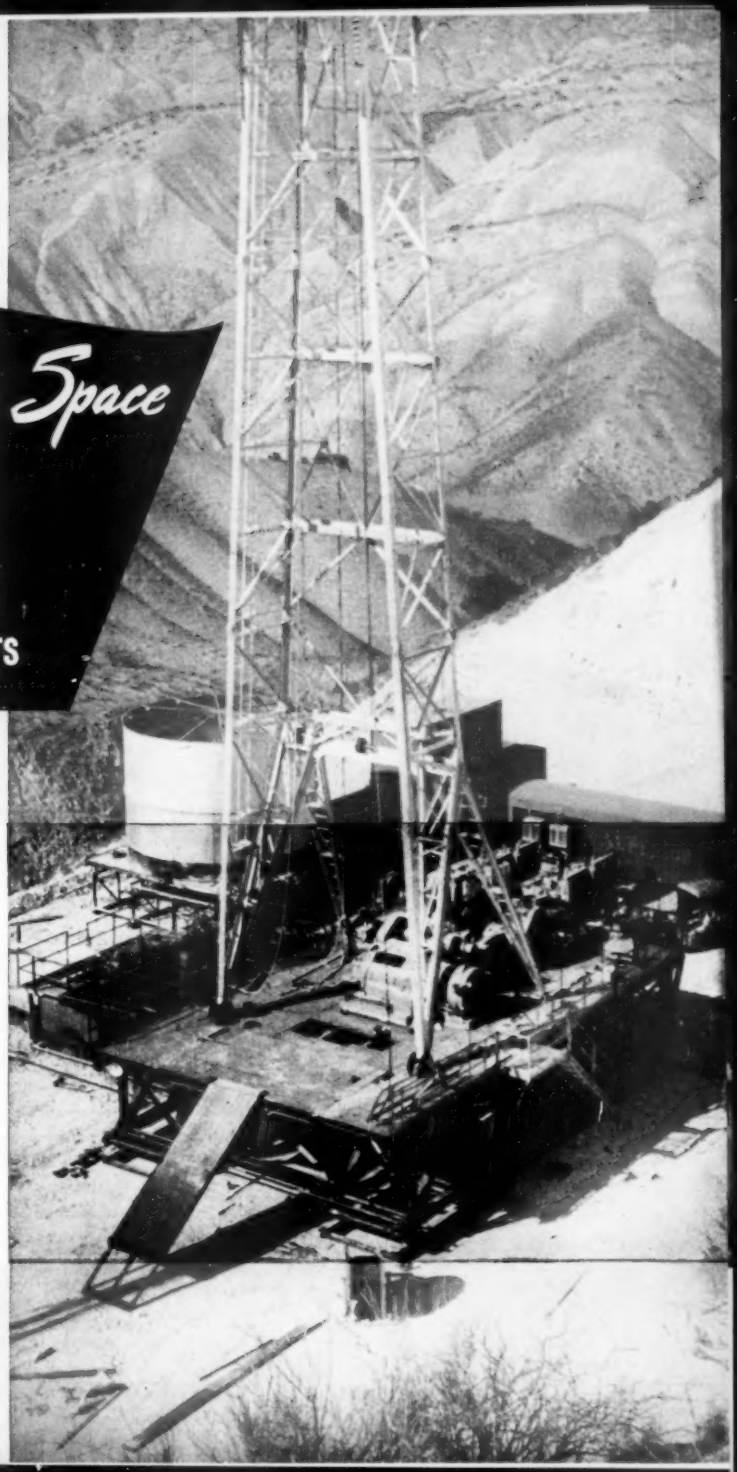
Improvements in design of a skid-mounted natural-gasoline plant have been analyzed through the construction of an exact model by Guinn T. Williamson, of Tulsa. Williamson is portable plants supervisor of the chemical plants division of Blaw-Knox Construction Co.

The model is an exact replica of a plant designed for a gas throughput of 5,000 M.c.f. per day. It features an automatic safety shutdown system which requires minimum supervision. The absorber has a design range of 200 to 400 psig.

Williamson constructed the model on a scale of 1 ft. to the inch. It was made of wood with the exception of the absorber and large pipe bends which are of plastic. Pipe, valves, and fittings are wood and were turned on a lathe.

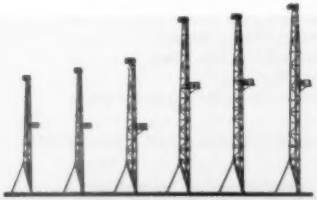
Specifications for the model were furnished by Blaw-Knox, which firm manufactures the original equipment.

PLENTY OF *Working Space* IS A FEATURE OF LEE C. Moore MASTS



Pictured here is the bottom portion of a Lee C. Moore 133 feet Cantilever Mast. This picture illustrates the very generous floor space which is a feature of each Lee C. Moore Mast.

The rear legs of the mast are hinged to allow clearance for the largest drawworks.



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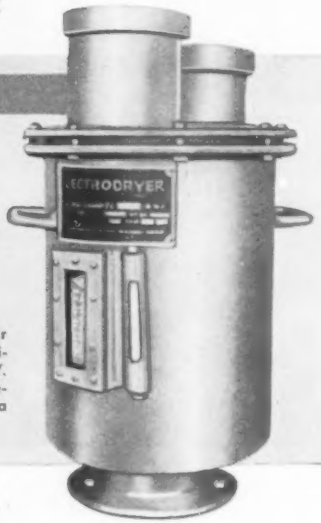
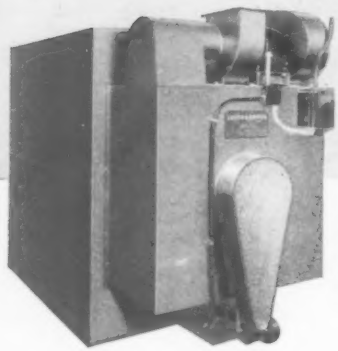
The moist air they're inhaling wastes money and destroys quality





A tank breathes freely, as air passes through the charge of Activated Alumina and is dried DRY. When a Lectrobreather needs reactivation, it is lifted off and a spare takes its place.

Where volumes of air passing in and out of a storage tank are sufficient, a Lectrodryer* is used. Since its DRYing-reactivating cycle can be reversed as required, it stays right on the job.

A processor was buying certain liquids in drums, *at premium prices*, because the moisture in the air the storage tanks inhaled injured their quality. Then he discovered Lectrobreathers, which feed only DRY air to the tanks. Now he buys in tank-car lots, saving on raw materials, saving on handling and holding quality constant.

An oil company safeguards its fine lubricating oils against contamination by water from the time it is refined until it is safely packaged. They hold a blanket of DRY air over the oil by forcing the tanks to breathe through Lectrodryers, that remove every trace of moisture from the air.

Lectrobreathers and Lectrodryers will make certain that any tank, little or big, breathes only DRY air. Which to use is determined by the size of the DRYing task: A Lectrobreather has a color indicator which tells when it should be reactivated. Operation of a Lectrodryer can be made fully automatic.

For help in selecting and applying the DRYing equipment you need, tell your problem to Pittsburgh Lectrodryer Corporation, 325 32nd Street, Pittsburgh 30, Pennsylvania.

In England: Birlec, Limited, Tyburn Road, Erdington, Birmingham.
In Australia: Birlec, Limited, 51 Parramatta Road, Glebe, Sydney.
In France: Stein et Roubaix, 24 Rue Erlanger, Paris XVI.
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LECTRODRYER

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THE JOURNAL'S WEEKLY
Engineering Reference
SECTION

No. 25

FANS AND BLOWERS:

Part 6—Fan Calculations—Properties of Gases and Vapors

by M. Van Winkle*

THE volume, pressure, temperature, and density relationships for single-component gases can be expressed by the modified ideal gas law:

$$PV = ZnRT$$

For ideal gases and for nonideal gases at low pressures, Z, the compressibility factor is equal to, or approximately equal to, unity. Because with fan and blower installations low pressures are usually encountered, Z is assumed to be unity. Therefore:

$$PV = nRT = \frac{W}{M} RT$$

where
P = absolute pressure
V = volume
Z = compressibility factor
W = weight
M = molecular weight
n = number of moles
R = gas law proportionality factor

Density, ρ, is defined by the ratio of the weight per unit volume, or:

$$\rho = \frac{W}{V}$$

Substituting and rearranging:

$$\rho = \frac{PM}{RT}$$

where ρ is the density. Inspection of the above relations indicates that V varies directly with absolute temperature and inversely with the absolute pressure; ρ, on the other hand, varies directly with the absolute pressure and inversely with the absolute temperature. **Viscosity,** a property influencing friction in flow systems, can be determined by experimental methods or calculated.

*Professor of chemical engineering, University of Texas.

Viscosity data are available for air and a large number of single-component gases and vapors.

Viscosities of single component gases may also be calculated from the relation:

$$\mu/\mu_0 = (T/273.1)^n$$

where
μ = viscosity in centipoises at T
μ_0 = viscosity in centipoises at 0° C. (273.1 °K.)
T = temperature in °K.
n = factor evaluated from available data (or given in handbooks)

Gas mixtures . . . The gases or vapors normally handled by fan or blower systems are mixtures of two or more components. If the gas mixture can be considered to be ideal, then Amagat's law of additive volumes will apply. This is expressed by:

$$V_T = v_1 + v_2 + v_3 + \ldots + v_n$$

where V_T is the total volume of the mixture, and the v's represent the volume of the individual components in the mixture. For one mole of mixture $v_1 = y_1 V_T$. Thus, the volume fraction and the mole fraction are the same for any individual component.

$$V_T = \sum_1^n yV_T$$

$$= y_1V_T + y_2V_T + \ldots + y_nV_T$$

The density of a gas mixture is equal to the total weight of the mixture divided by the total volume or:

$$\rho_m = \frac{W_m}{V_T}$$

The total weight of the mixture is the sum of the weights of the individual components in the mixture:

$$W_m = W_1 + W_2 + \ldots + W_n$$

On the basis of one mole of mixture:

$W_1 = y_1M_1$ and $W_2 = y_2M_2$, etc.

where
W_1 = weight of component 1
y_1 = mole fraction
M_1 = molecular weight of component 1

Thus the molal density of the mixture is expressed as the summation of the individual weights of the components in the mixture divided by the total volume:

$$\rho_m = \frac{\sum_1^n W}{V_T} = \frac{y_1M + y_2M_2 + \ldots + y_nM_n}{V_T}$$

This density represents the molal density of the mixture or the weight of gas per mole of mixture. In order to get the density in terms of weight per unit volume; e.g., pounds per cubic foot, the molal density is divided by the volume in cubic feet per mole of the gas at the conditions desired. All "ideal" gases have the same volume per mole at the same conditions.

Thus 1 mole
= 359 cu. ft. at 760 mm., 32° F.
= 379 cu. ft. at 760 mm., 60° F.
= 387 cu. ft. at 760 mm., 70° F.

Effect of entrained solids . . . Pressure and temperature have little effect on the volume of solids compared to the effect on the volume of gases. In calculating the density of a gas mixture containing solids it is not necessary to correct for the effect of temperature and pressure on the solids. The density of a gas containing entrained solids is:

$$\rho_s + \frac{W_s + W_m}{V_s + V_T}$$

where
ρ_s = density of gas-solid mixture
W_s = weight of solids per unit volume, V_T
V_s = volume of solids per unit volume, V_T
W_m = weight of gas mixture per unit volume, V_T
V_T = volume of solids-free gas mixture

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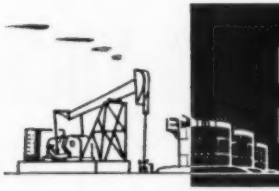


Finding an Empirical Equation Graphically

by Ralph F. Nielsen*

WHEN one quantity varies with another it is usually possible to express the one approximately in terms of the other by means of an equation. An equation expressing the one as a function of the other, such as production as a function of time, is often determined empirically from data, and it is then called an empirical equation.

The process of finding an empirical equation consists of two steps. First the form of the equation must be determined, usually by plotting the data in some manner. Second, the values of the constants, e.g., the values of a and b in the form $P = a + bt$, must be determined. The constants may sometimes be found rather directly from the graphs, or they may be found by one of several algebraic means. Some graphical methods will be illustrated here.

Plotting the data . . . A direct plot of the data on one or more of the types of coordinate paper is generally advisable. Unless a straight line is immediately indicated on log paper or semilog paper, it is in any case desirable to make a plot on ordinary Cartesian paper.

Drawing the curve . . . In drawing the "best" curve through a set of points one should not be influenced by the plastic curves available, but reserve these for the final drawing. The curve should be sketched freehand first, with continuously increasing or decreasing slope and curvature (unless there are reasons to the contrary) and such that extrapolations at both ends follow naturally in the expected directions.

Evidence of type . . . The preliminary plots will often indicate the type of equation. It is usually advisable, both for extrapolation purposes and as a test of type, to make a plot in such a manner that a straight line is obtained. Such plots are indicated in connection with the separate types.

(a) $P = a \times 10^{bt} = ae^{ct}$ where $c = 2.3\ b$. The data should give a straight line on semilog paper (Fig. 1). In that case a is the intercept on the $t = 0$ axis, and b is the reciprocal of the change in t corresponding to a tenfold change in P. In the example, $P = 230 \times 10^{-0.18\ t} = 230\ e^{-0.41\ t}$, the negative exponent corresponding to the negative slope. For convenience t may be measured from such a reference point as to avoid an excessively large value of a.

(b) $P = a\ t^{*b}$ where t^* is the time measured from such a reference point that a straight line is obtained on log paper. The value of b is given by the tangent of the angle that the line makes with the horizontal, and a is the value of P at $t^* = 1$. From Fig. 2, $P = 250\ t^{*-0.6}$.

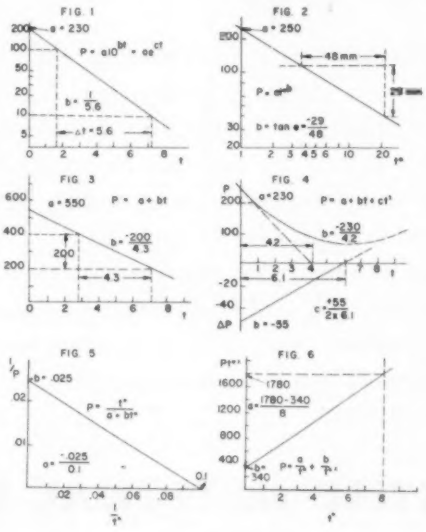
(c) $P = a + bt$. For a linear decline, a is the intercept at $t = 0$ and b the slope. In Fig. 3, $P = 550 - 47\ t$.

(d) $P = a + bt + ct^2$, where t may or may not be "corrected." Since this is the equation of a parabola, it will not correspond to a decline curve over a very large range of t. A plot of ΔP, the change in production per unit change in t, against t, should give a straight line. The value of a is given by the intercept at $t = 0$, b by the slope at $t = 0$, and c by one-half the slope of the ΔP line. The reference time is immaterial for the type of graph, hence it is desirable to choose such a reference point that a and b do not become excessively large. From Fig. 4, $P = 230 - 55\ t + 4.5\ t^2$.

(e) $P = t^*/(a + bt^*)$. A straight line should be obtained when $1/P$ is plotted abainst $1/t^*$. Then b is the value of $1/P$ at $1/t^* = 0$ and a is the "slope" of the line. Fig. 5 gives $P = t^*/(-0.25 + 0.025\ t^*)$.

(f) $P = a/t^* + b/t^{*2}$. A plot of Pt^{*2} against t^* should give straight line (Fig. 6). The value of b is given by Pt^{*2} at $t^* = 0$ and that of a by the "slope" of the line. From the figure, $P = 180/t^* + 340/t^{*2}$.

Modifications or combinations of the above types usually require a certain amount of algebra in addition to the procedures given here. For instance, in the case of the form $P = ae^{bt} + c$, c must first be determined algebraically, after which $P - c$ may be plotted against t on semilog paper.



*Associate professor, petroleum and natural-gas engineering, Pennsylvania State College.

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MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

by W. L. Nelson
Technical Editor

COST-imating

Material Prices Faltering—Wages Increasing

THE cost indexes of specific construction materials, and labor rates shown on this page (prepared by W. L. Nelson, technical editor of The Oil and Gas Journal and consultant), may be used to bring the many costs published in the Cost-imating series (October 21, 1948, weekly through December 29, 1949) to current prices. Similar itemized cost indexes are published quarterly in the first weekly issues. The Nelson Refinery Construction Cost Index appears in the first weekly issue each month.

Wages, of all categories, were increasing in May. Only 6 materials items increased in cost during May, but 17 materials items could be purchased at slightly lower prices.

Itemized Cost Indexes

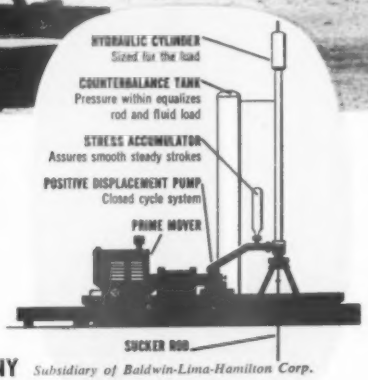
(Multiply the 1946 prices of the Cost-imating Series by these Index Numbers divided by 100.)

	1948	1949	1950	1951	May 1952	References*	Index for earlier years (The Oil and Gas Journal unless noted) Costimating
Labor:							
Skilled construction	125.0	133.9	140.0	148.3	155.4	Eng. News Record	No. 55—Nov. 3, 1949
Common labor	131.0	140.4	148.1	156.8	163.6	Eng. News Record	No. 55—Nov. 3, 1949
Refinery construction	128.0	137.1	144.0	152.5	159.5		No. 61—Dec. 15, 1949
Refinery operation	126.0	132.9	137.6	149.1	151.9	Sur. of Current Business	No. 55—Nov. 3, 1949
Equipment or materials‡:							
(1) Boilers, tanks and sheet metal	†140.0	†134.8	†136.0	†156.1	†154.1	Code 10-7-2	April 21, 1952§
(2) Bldg. materials (nonmetallic)	147.1	151.2	154.8	164.3	163.4	Code 13	No. 22—Mar. 17, 1949
(3) Brick—building	122.8	127.7	132.5	141.2	140.5	Code 13-4-1	No. 20—March 3, 1949
(4) Brick—fireclay	133.3	139.8	153.4	165.3	165.2	Code 13-4-2	
(5) Castings (foundry products)	144.6	150.5	152.9	167.2	167.4	Code 10-1-5	No. 46—Sept. 1, 1949
(6) Clay products (structural, etc.)	121.3	126.0	134.6	145.2	145.1	Code 13-4	No. 20—March 3, 1949
(8) Concrete—ingredients	119.4	123.7	125.3	132.7	132.5	Code 13-2	No. 22—Mar. 17, 1949
(9) Concrete—products	118.9	121.7	124.4	132.8	132.5	Code 13-3	
(10) Electrical machinery	127.6	130.9	134.9	154.3	153.1	Code 11-7	See Marshall-S. (below)
(11) Electrical motors & generators	128.6	128.7	135.0	155.8	155.5	Code 11-7-3	No. 31—May 19, 1949
(12) Electrical transformers, etc.	127.0	129.7	131.6	147.7	147.8	Code 11-7-4	No. 31—May 19, 1949
(13) Engines (composite)	116.9	134.8	126.0	146.1	144.8	Code 11-5-4	No. 36—June 23, 1949
(16) Exchangers	130.0	133.0	140.0	152.0	163.0	Manufacturer	No. 2—Oct. 28, 1948
(17) Fans and blowers	131.3	152.2	162.9	190.1	183.2	Code 11-4-7	Feb. 17, 1949§
(18) Hand tools	125.2	134.0	143.2	154.2	154.4	Code 10-4-2	
(19) Instruments (composite)	120.0	123.1	127.8	143.3	142.4	Manufacturer	No. 34—June 9, 1949
(20) Flow meter (mechanical)	....	109.2	114.0	126.8	126.8	Manufacturer	No. 34—June 9, 1949
(21) Flow meter (air control)		132.4	138.5	157.6	157.6	Manufacturer	No. 34—June 9, 1949
(22) Flow meter (remote)		130.2	135.5	151.7	151.7	Manufacturer	No. 34—June 9, 1949
(23) Potentiometer, 6-point		125.8	134.0	146.6	146.6	Manufacturer	No. 34—June 9, 1949
(24) Potentiometer, air control		131.6	134.1	136.8	136.8	Manufacturer	No. 34—June 9, 1949
(25) Pressure controller		130.2	133.6	153.3	153.3	Manufacturer	No. 34—June 9, 1949
(26) Pressure gage		100.0	101.2	108.6	108.6	Manufacturer	No. 34—June 9, 1949
(27) Thermometer (recording)		118.6	124.0	144.3	144.3	Manufacturer	No. 34—June 9, 1949
(28) Control valve		129.8	133.3	155.5	155.5	Manufacturer	No. 34—June 9, 1949
(29) Insulation materials	126.8	123.6	123.0	128.8	129.9	Code 13-7-2	
(30) Lumber (composite)	181.0	165.3	193.0	208.5	204.2	Code 8-1	No. 7—Dec. 2, 1948
(31) Lumber (Southern Pine)	174.3	157.7	176.9	189.1	189.9	Code 8-1-2	No. 7—Dec. 2, 1948
(32) Lumber (other soft woods)	206.5	203.9	220.2	252.7	246.3	Code 8-1-3	
(33) Machinery—general purpose	124.9	131.9	136.7	153.0	152.4	Code 11-4	Feb. 17, 1949§
(34) Machinery—construction	127.8	136.0	140.1	155.3	155.6	Code 11-2	
(35) Machinery—oil field	†125.9	†132.9	†135.8	†149.6	†149.6	Code 11-5-1	
(36) Paint and paint materials	143.0	141.2	136.9	153.9	151.7	Code 6-2	No. 22—Mar. 17, 1949
(37) Paints—prepared	141.4	142.8	140.0	155.8	155.9	Code 6-2-1	
(38) Pipe, sewer	†119.1	†119.3	†129.9	†147.1	†147.1	Code 13-4-5	No. 22—Mar. 17, 1949
(39) Pumps, air compressors, etc.	127.0	135.9	138.2	155.9	155.6	Code 11-4-1	No. 29—May 5, 1949
(42) Steel (iron and steel)	141.1	143.3	152.9	166.7	165.9	Code 10-1	No. 61—Dec. 15, 1949
(43) Steel—finished steel	160.4	173.8	182.6	196.9	197.6	Code 10-1-4	
Steel—plate and sheet	(See boilers, tanks, etc., above)						
(44) Valves and fittings	†125.9	†132.9	†135.8		†226.3	Code 11-4-9	No. 46—Sept. 1, 1949
Marshall-Stevens equipment (only) indexes:							
Process industries (average)	131.5	131.5	135.8	144.9	144.9	Chem. Eng. May 1952	Chem. Eng. Feb. 1951
Chemical	130.0	130.0	133.8	142.5	142.6	Chem. Eng. May 1952	Chem. Eng. Feb. 1951
Petroleum	132.0	132.0	136.5	145.6	145.7	Chem. Eng. May 1952	Chem. Eng. Feb. 1951
Electrical power	135.0	135.0	139.3	148.3	148.4	Chem. Eng. May 1952	Chem. Eng. Feb. 1951
Refrigeration	141.0	139.9	147.3	159.2	159.3	Chem. Eng. May 1952	Chem. Eng. Feb. 1951
Steam power	132.0	132.0	136.6	146.5	146.6	Chem. Eng. May 1952	Chem. Eng. Feb. 1951
Nelson Refinery Construction	132.5	139.6	146.2	157.2	160.6		No. 61—Dec. 15, 1949

*Code refers to the revised index code number of the Bureau of Labor Statistics, U. S. Department of Labor, "Wholesale Prices." †Estimated base value for 1946. ‡Not exactly the same items as those published heretofore. §Questions on Technology.

PELTON

Long Stroke Hydraulic Pumping Jack



Here in a West Texas field is a typical installation of a PELTON Long Stroke Hydraulic Pumping Jack. This is the most modern, most efficient surface pumping unit ever devised for the sucker rod pumping of oil wells. With PELTON, each well may be pumped to its maximum potential and lifting costs reduced to the absolute minimum.

Hundreds of PELTON installations in Mid-continent and California fields have proved Long Stroke Hydraulic Pumping the most satisfactory method for pumping the deeper wells and the shallow wells with heavy production.

PELTON Jacks are available in seven models with polished rod load ratings from 20,000 to 40,000 lbs. Stroke lengths 10, 20 and 30 ft. The complete story on this modern and successful method of pumping is contained in PELTON's new catalog.

PELTON WATER WHEEL COMPANY *Subsidiary of Baldwin-Lima-Hamilton Corp.*
OIL INDUSTRY MACHINERY DIVISION
2447 East 54th Street, Los Angeles 58, California

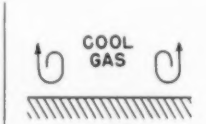
LOS ANGELES • AVENAL • SAN FRANCISCO • DALLAS • ODESSA • HOUSTON • NEW YORK • PHILADELPHIA

Part 8 of a series

by Dr. B. E. Lauer, Head, Department of Chemical Engineering, University of Colorado

h_f HEAT TRANSFER

COEFFICIENT of HEAT TRANSFER through FILM between WARM HORIZONTAL WALL and COOL GAS



Gas Movement: Natural Convection

Wall Position: Facing Upward

Size of Wall: Large - over 3 sq. ft.

EQUATION:

$$h_f = 0.162\ K \left[\frac{\rho^2 C_p \beta g \Delta t}{\mu K}\right]^{\frac{1}{3}}$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr.sq.ft.°F.

K - Thermal conductivity of gas at t_f, in BTU/hr. sq. ft. °F./ft.

L - Length of wall, ft.

ρ - Density of gas at t_f, lb./cu. ft.

C_p - Specific heat of gas at constant pressure, BTU/lb. °F.

β - Coefficient of volumetric expansion of gas at t_f. (1/°R.) (cu. ft./cu. ft.)/°F.

g - Acceleration of gravity. 4.17×10^8 ft./hr.^{2}

Δt - Temperature difference between wall and gas, °F.

μ - Viscosity of the gas at t_f, lb./ft. hr.

t_f - Film temperature, °F. Assume to be arithmetic average of wall temperature and bulk gas temperature.

LIMITATIONS: Heat transfer surface must be over 3 sq. ft.

SPECIAL CASE: Air at room temperature and one atmosphere:

$$h_f = .38\ (\Delta t)^{.25}$$

SOURCES OF DATA: For physical constants for use in above equation see Chemical Engineers' Handbook, J. H. Perry, (1948).

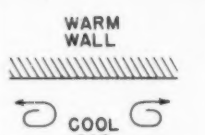
for ρ -- see pp. 130-148, 175-195, 1583.
μ -- see pp. 370-374, 1198, 1696.
β -- see p. 200-202.
K -- see pp. 459-461, 1303, 1697.
C -- see pp. 228-235, 297, 1588, 1696.

REFERENCES:

1. Heat Transmission, William H. McAdams, pp. 237-251.
2. "Free Convection," W. J. King, Mechanical Engineering, 54, 347, (1938).
3. "Surface Heat Transmission," H. H. Heilman, Trans. Am. Soc. Mech. Engrs., FSP 51, 287-304, (1929).
4. "Physical Constants of Organic Vapors," Industrial and Engineering Chemistry, 35, 1048 (1943).
5. Introduction to Heat Transfer, Brown and Marco, p. 114.
6. "Studies in Heat Transmission," Colburn and Hougen, Industrial & Engr. Chemistry, 22, 522, (1930).

B 4 a (2) (a)

COEFFICIENT of HEAT TRANSFER through FILM between WARM HORIZONTAL WALL and COOL GAS



Gas Movement: Natural Convection

Wall Position: Facing Downward

Size of Wall: Large - over 3 sq. ft.

EQUATION:

$$h_f = 0.08\ K \left[\frac{\rho^2 C_p \beta g \Delta t}{\mu K}\right]^{\frac{1}{3}}$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr.sq.ft.°F.

K - Thermal conductivity of gas at t_f, in BTU/hr. sq. ft. °F./ft.

L - Length of wall, ft.

ρ - Density of gas at t_f, lb./cu. ft.

C_p - Specific heat of gas at constant pressure, BTU/lb. °F.

β - Coefficient of volumetric expansion of gas at t_f. (1/°R.) (cu. ft./cu. ft.)/°F.

g - Acceleration of gravity. 4.17×10^8 ft./hr.^{2}

Δt - Temperature difference between wall and gas, °F.

μ - Viscosity of the gas at t_f, lb./ft. hr.

t_f - Film temperature, °F. Assume to be arithmetic average of wall temperature and bulk gas temperature.

LIMITATIONS: Heat transfer surface must be over 3 sq. ft.

SPECIAL CASE: Air at room temperature and one atmosphere:

$$h_f = 0.2\ (\Delta t)^{0.25}$$

SOURCES OF DATA: For physical constants for use in above equation see Chemical Engineers' Handbook, J. H. Perry, (1948).

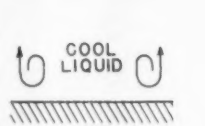
for ρ -- see pp. 130-148, 175-195, 1583.
μ -- see pp. 370-374, 1198, 1696.
β -- see p. 200-202.
K -- see pp. 459-461, 1303, 1697.
C -- see pp. 228-235, 297, 1588, 1696.

REFERENCES:

1. Introduction to Heat Transfer, Brown and Marco, p. 114.
2. Heat Transmission, 2nd Edition, McAdams, p. 240.
3. "Free Convection," W. J. King, Mechanical Engineering, 54, 347, (1938).
4. "Surface Heat Transmission," H. H. Heilman, Trans. Am. Soc. Mech. Engrs., FSP 51, 287-304, (1929).

B 4 a (2) (b)

COEFFICIENT of HEAT TRANSFER through FILM between WARM HORIZONTAL WALL and COOL LIQUID



Liquid Movement: Natural Convection.

Wall Position: Facing Upward

Size of Wall: Large

EQUATION:

$$h_f = 0.162\ K \left[\frac{\rho^2 C \beta g \Delta t}{\mu K}\right]^{\frac{1}{3}}$$

TERMINOLOGY:

h_f - Film coefficient of heat transfer, BTU/hr.sq.ft.°F.

K - Thermal conductivity of liquid at t_f, BTU/hr. sq. ft. °F./ft.

L - Length of wall, ft.

ρ - Density of liquid at t_f, lb./cu. ft.

C - Specific heat of liquid at constant pressure, BTU/lb. °F.

β - Coefficient of volumetric expansion of liquid at t_f. (cu. ft./cu. ft.)/°F.

g - Acceleration of gravity, 4.17×10^8 ft./hr.^{2}

Δt - Temperature difference between wall and liquid, °F.

μ - Viscosity of the liquid at t_f, in lb./ft. hr.

t_f - Film temperature, °F. Assume to be arithmetic average of wall temperature and bulk liquid temperature, °F.

LIMITATIONS: Heat transfer surface must be over .15 ft. if tilted into vertical position.

SOURCES OF DATA: Physical constants for above equation may be obtained from Chemical Engineers' Handbook by John H. Perry (1948).

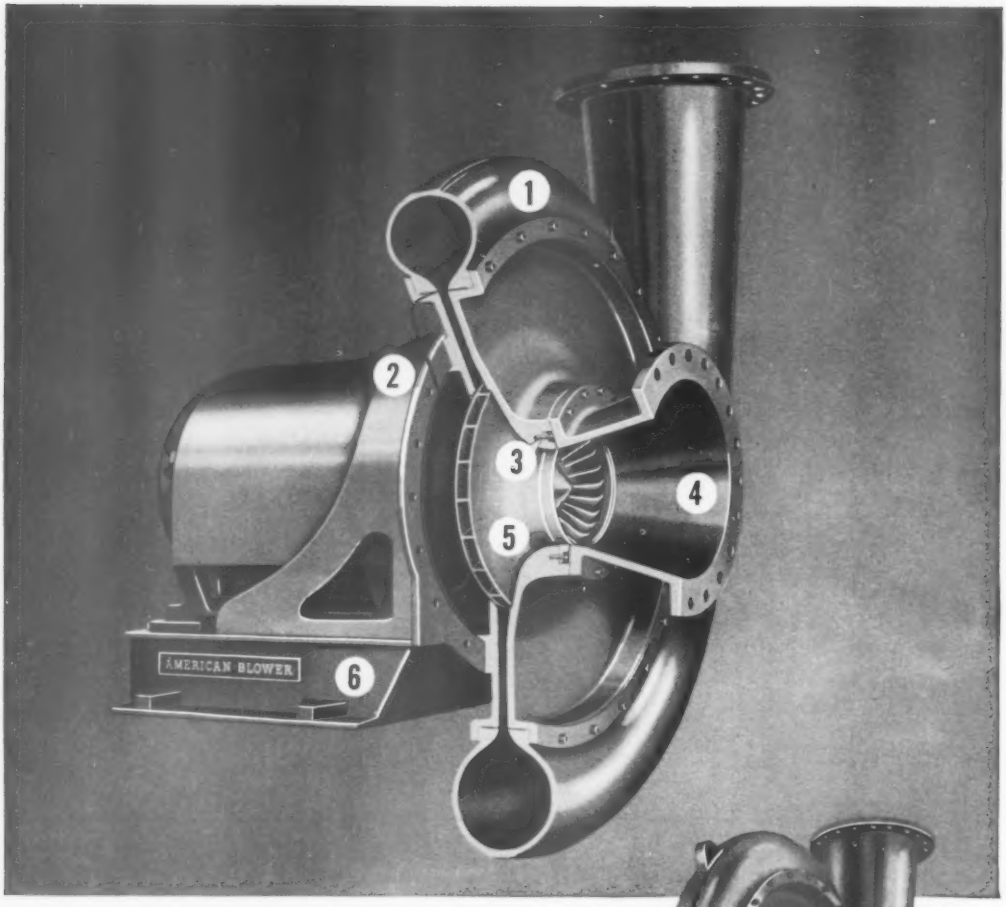
for ρ -- see pp. 130-148, 175-195, 1583.
μ -- see pp. 370-374, 1198, 1696.
β -- see p. 200-202, 1878.
K -- see pp. 459-461, 1303, 1697.
C -- see pp. 228-235, 297, 1588, 1696.

REFERENCES:

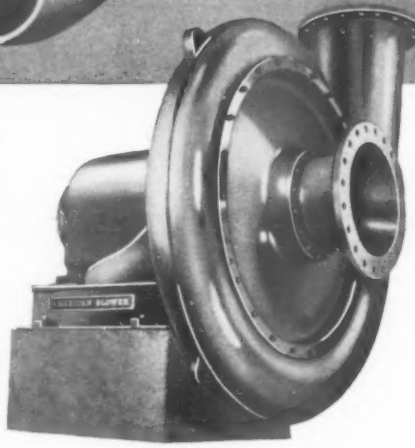
1. Introduction to Heat Transfer, Brown & Marco, p. 114.
2. Heat Transmission, William H. McAdams, pp. 237-251.
3. "Free Convection," W. J. King, Mechanical Engineering, 54, 347, (1938).
4. "Surface Heat Transmission," H. H. Heilman, Trans. Am. Soc. Mech. Engrs., FSP 51, 287-304, (1929).
5. Applied Heat Transmission, Herman J. Stoever, pp. 100.
6. "Studies in Heat Transmission," Colburn and Hougen, Industrial and Engineering Chemistry, 22, 522, (1930).

B 5 a (2) (a)

American Blower... a great



In cutaway view above: (1) Improved scroll-shaped casing design results in increased compressor efficiency. (2) Unobstructed, long diffuser passage converts velocity energy into pressure; provides quiet operation. (3) Annulus packing minimizes recirculation of gas around impeller inlet. (4) Removable inlet nozzle assures accurate alignment of annulus packing when assembled with impeller. (5) Aero-dynamic design of impeller blades results in high efficiencies, long life. (6) Welded steel baseplate is "stress relieved" prior to machining—assuring maintained alignment.



name in air handling, *offers you*

An outstanding line of centrifugal compressors

Single stage design. Sizes from 30 to 600 HP.
Pressures from 1¼ to 3¾ lbs.

If your job calls for delivery of large volumes of air or gases, dependable American Blower Single Stage Centrifugal Compressors are just the ticket.

They're compact, require minimum foundations, are adaptable to all types of drives — electric motor, turbine or engine.

Except for the bearings, no other parts come in contact with each other — holding maintenance to an absolute minimum. Air or gases do not become contaminated since no internal lubrication is required.

Prior to shipment, each American Blower compressor is thoroughly tested in accordance with the A.S.M.E. Power Test Code for Centrifugal Compressors and Exhausters.

If you'd like complete, concise technical data, consult the nearest American Blower Branch Office or write us for Bulletin 109.

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CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American Radiator & Standard Sanitary corporation

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • YORKWARDS IRON

smooth

destructive pressure peaks

ELIMINATE MUD LINE SHOCKS...

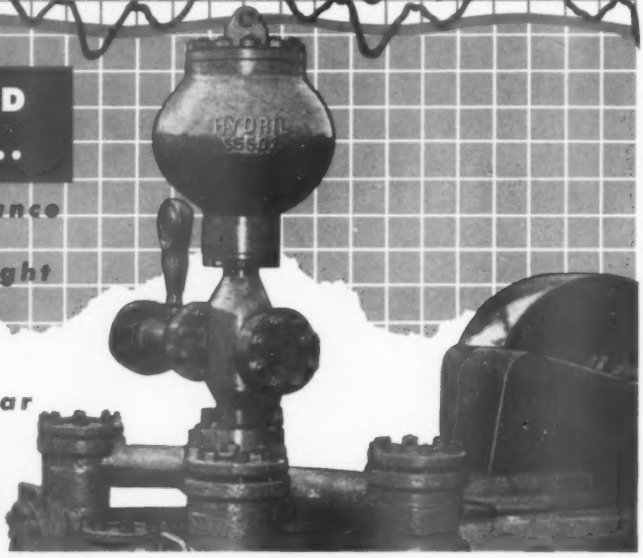
cut pump maintenance

keep pipe joints tight

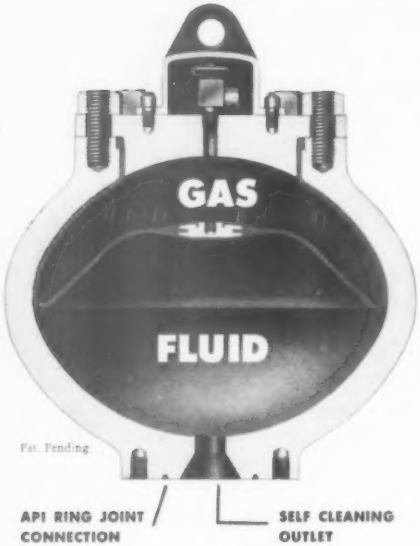
lengthen hose life

reduce packing wear

increase efficiency



HYDRIL *K-20* *slush pump* PULSATION DAMPENER



check these advantages

1. **SAFETY**—Thick-walled alloy steel body with integral API ring joint flange provides great strength in a rigid, compact assembly.
2. **LARGE SURGE CAPACITY**—Body cavity contains only the synthetic rubber diaphragm with compressed nitrogen above it. There is no "dead space" in the body—it's all available for surge displacement.
3. **SIMPLE DESIGN**—Only 3 main parts. Diaphragm can be easily and quickly replaced in the field with regular rig tools.
4. **SELF-CLEANING**—Pre-charge pressure completely displaces fluid when pump is shut down. Sediment can't accumulate; maximum operating efficiency is assured at all times.
5. **LONG DIAPHRAGM LIFE**—Diaphragm moves freely from one end position to the other without undue stress and wrinkling. Provides maximum economical, trouble-free operation.

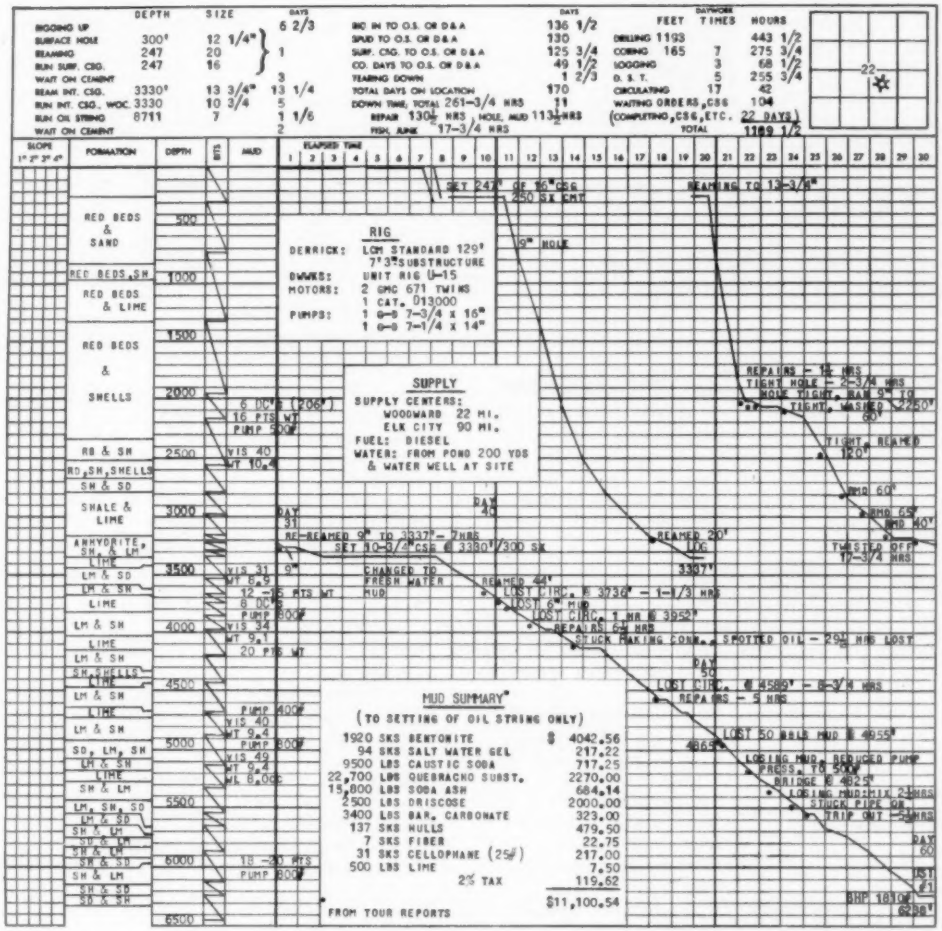
for complete information call or write

HYDRIL COMPANY

LOS ANGELES, CALIF. HOUSTON, TEXAS

Anadarko Basin Drill Log

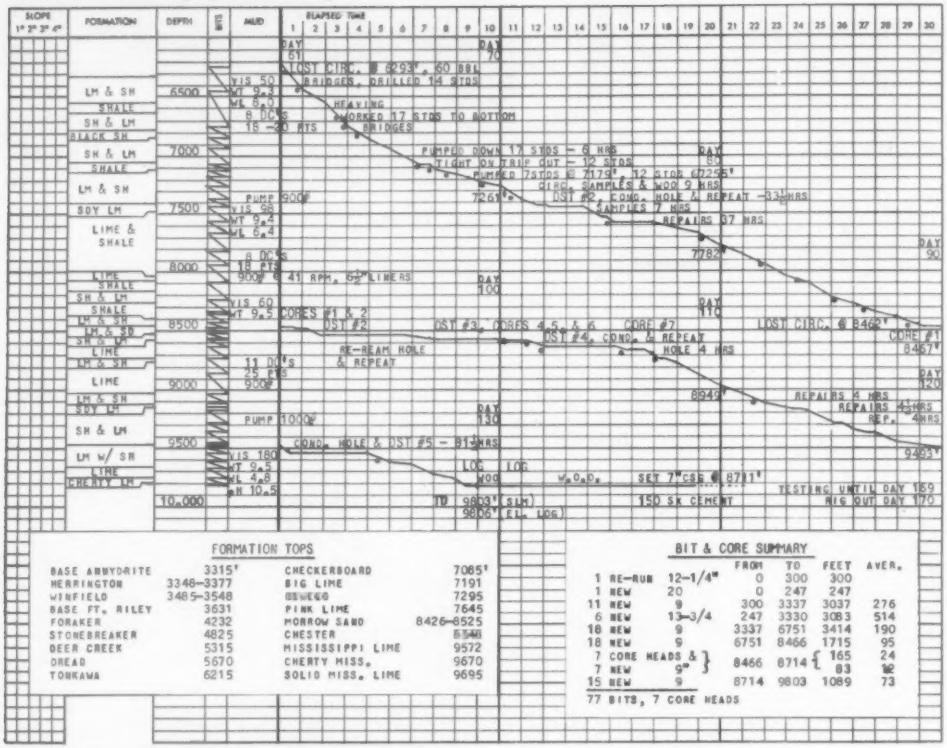
Contractor: Portable Drilling Co.
Owner: Carter Oil Co.
Well: Keith C. Rosendale 1.
Location: Discovery well of South Salon field, Ellis County, Oklahoma, Section 22-23n-24w.


RIG
DERRICK: LCM STANDARD 129' 7'3" SUBSTRUCTURE
DRWKS: UNIT RIG U-15
MOTORS: 2 GMC 671 TWINS 1 CAT. D13000
PUMPS: 1 G-B 7-3/4 x 16" 1 G-B 7-1/4 x 14"
SUPPLY
SUPPLY CENTERS: WOODWARD 22 MI. ELK CITY 90 MI.
FUELS: DIESEL
WATER: FROM POND 200 YDS & WATER WELL AT SITE
MUD SUMMARY*
(TO SETTING OF OIL STRING ONLY)
1920 SKS BENTONITE $ 4042.56
94 SKS SALT WATER GEL 217.22
9500 LBS CAUSTIC SODA 717.25
22,700 LBS QUEBRACHO SUBST. 2270.00
15,800 LBS SODA ASH 684.14
2500 LBS DRISCOSE 2000.00
3400 LBS BAR. CARBONATE 323.00
137 SKS HULLS 479.50
7 SKS FIBER 22.75
31 SKS CELLOPHANE (25#) 217.00
500 LBS LIME 7.50
2% TAX 119.62
$11,100.54
* FROM TOUR REPORTS
SET 247' OF 16" CSG 250 SX EMT
9" HOLE
REAMING TO 13-3/4"
REPAIRS - 1½ HRS
TIGHT HOLE - 2-3/4 HRS
HOLE TIGHT, RAN 9" TO 2280'
TIGHT, WASHED 60'
TIGHT, REAMED 120'
MUD 60'
MUD 65'
MUD 40'
TWISTED OFF 17-3/4 HRS
REAMED 20'
LOG 3387'
RE-REAMED 9" TO 3337' - 7 HRS
SET 10-3/4" CSG @ 3380' W/300 SX
CHANGED TO FRESH WATER MUD
REAMED 44'
LOST CIRC. @ 3736' - 1-1/3 HRS
MUD 6# MUD
LOST CIRC. 1 HR @ 3952'
REPAIRS 6¼ HRS
STUCK MAKING CONN., SPOTTED OIL - 29½ HRS LOST
LOST CIRC. @ 4589' - 8-3/4 HRS
REPAIRS - 5 HRS
LOST 50 BBLS MUD @ 4655'
4863'
LOSING MUD, REDUCED PUMP PRESS. TO 500#
BRIDGE @ 4825'
LOSING MUD-MIX 2 HRS
STUCK PIPE 0#
TRIP OUT - 5½ HRS
DAY 60
DST #1
BHP 1810#
6236'

(Continued on next page)

Compiled for The Oil and Gas Journal, by Drilling Data Service, Oklahoma City

Modern Drilling (continued)



FORMATION TOPS

BASE ANHYDRITE	3315'	CHECKERBOARD	7085'
HERRINGTON	3348–3377	BIG LIME	7191
WINFIELD	3485–3548	OSWEGO	7295
BASE FT. RILEY	3631	PINK LIME	7645
FORAKER	4232	MORROW SAND	8426–8525
STONEBREAKER	4825	CHESTER	8548
DEER CREEK	5315	MISSISSIPPI LIME	9572
DREAD	5670	CHERTY MISS.	9670
TONKAWA	6215	SOLID MISS. LIME	9695

BIT & CORE SUMMARY

			FROM	TO	FEET	AVER.
1	RE-RUN	12-1/4"	0	300	300	
1	NEW	20	0	247	247	
11	NEW	9	300	3337	3037	276
6	NEW	13-3/4	247	3330	3083	514
10	NEW	9	3337	6751	3414	190
18	NEW	9	6751	8466	1715	95
7	CORE HEADS & 7 NEW	9"	8466	8714	165	24
					83	12
15	NEW	9	8714	9803	1089	73

77 BITS, 7 CORE HEADS

Check Chart for Sick Oil-Field Chains . . .

SYMPTOMS	POSSIBLE CAUSES	REMEDIES
Excessive noise	Misalignment.	Check alignment and correct.
	Too little or too much slack.	Adjust centers for proper chain slack.
	None or improper lubrication.	Lubricate.
	Loose casing or bearings.	Draw up all bolts and brace casings if necessary.
	Chain or sprockets worn.	Reverse* or replace if necessary.
Wear on chain side-bars and sides of teeth	Misalignment.	Remove chain and correct alignment.
Chain climbs sprockets	Poorly fitting sprockets.	Turn sprockets and chain* or replace if necessary.
	Severe overloads.	Reduce load if possible—lubricate driven machine.
	Chain worn overlength.	
Broken pins and rollers	Chain speed too high for the pitch.	Use chain of shorter pitch of equivalent or greater strength.
	Shock or suddenly applied loads.	Avoid shocks—easy starts give long life.
Chain clings to sprockets	Incorrect or worn sprockets.	Turn sprockets and chain* or replace if necessary.
	Heavy and tacky lubricants.	Clean chain and sprockets and lubricate correctly.
Chain whip	Long centers or high pulsating loads.	Reduce centers when possible.
	Too much slack.	
Chain gets stiff	Misalignment.	Check alignment and correct.
	Improper lubrication.	Remove chain, clean, and relubricate.
	Excessive overloads.	Reduce load when possible.
	Corrosion.	
Broken sprocket teeth	Obstruction—or foreign material in chain case.	Check chain clearances.
		Drain and clean chain case.
Cotters come out	Vibration and centrifugal force.	Turn chains over so heads of cotters are on inside nearest shafts.

(Courtesy Chain Belt Co.)

*Applies to cast or steel chain without rollers only.

Pipe-Line Construction

PRESENTED below is the status of the pipe-line industry's construction activity showing projects planned, under way, and uncontracted. These projects not yet contracted are preceded by a (•) to differentiate them from those contracted and under way to let the reader know at a glance the major construction work yet to be done. This information is gathered by The Oil and Gas Journal from contractors and pipeline companies first hand and published for your benefit.

Crude-Oil Pipe Lines

• **California-Oregon Pipe Line System**—103 miles, 6-in., proposed, Crescent City, Calif., to Medford, Oregon.

• **Cities Service Pipe Line Co.**—64 miles, 18-in., planned, Sour Lake, Tex., to Lake Charles, La. Completion date April 1953.

• **Continental Pipe Line Co.**—217 miles, 12-in., planned, Wichita Falls, Tex., to Ponca City, Okla. Completion date 1952.

• **Cooperative Refinery Association.**—48 miles, 6-in., planned, Phillipsburg, Kans., to Holdredge, Neb. Begin 3-53.

• **Gulf Refining Co.**—80 miles. 24-in., under way Midland to Colorado City, Tex., Anderson Bros.

22 miles, 10-in., under way, Wortham to Corsicana, Tex., Anderson Bros.

• **Humble Pipe Line Co.**—71 miles, 16-18-in., planned, East Texas to Louisiana-Texas border. (30 miles of 16 in., and 41 miles of 18-in.) Completion date 10-53.

• **Interstate Oil Pipe Line Co.**—22 miles, 18-in., planned, Texas to Shreveport, La.

68 miles, 16-in., planned, Raceland to Anchorage, La. Begin 4-53.

137.6 miles, 22-in., planned, Shreveport to Baton Rouge.

Interstate Oil Pipe Line Co.—52 miles, 16-in., under way, Sunset to Anchorage, La. Houston Contracting. Completion date 11-52.

• **Magnolia Pipe Line Co.**—29 miles, 8-in., planned, Midland County, Texas area.

Malco Refineries, Inc.—60 miles, 4-in., under way, Pettigrew, Tocito field to Hospah field (San Juan basin, New Mexico).

• **Pan American Pipe Line Co.**—27 miles, 26-in., begin 11-52. Genoa to Texas City, Tex. Completion date 3-53.

47 miles 16-in., begin 12-52, Arden Station in Irion County to Eldorado Station in Schleicher County, Texas. 3-53.

Pasotex Pipe Line Co.—195 miles, 8-in., under way, El Paso to Wink, Tex. McVean & Barlow, contractor. Completion date 1-1-53.

• **Phillips Pipe Line Co.**—45 miles, 12-in., planned, Rancho system to Sweeny, Tex. 3-53.

Phillips Pipe Line Co.—50 miles, 14-in., under way, looping in Duro and Rankin, Tex. area.

Platte Pipe Line Co.—1,075 miles, 16-20-in., under way, Worland, Wyo., to Wood River, Ill. Completion date 1952.

Worland, Wyo., to Holdredge, Neb. R. H. Fulton & Co., contractor. A. A. Carrigan, spreadman at Scotts Bluff, Neb.

Holdredge, Neb., to Kansas State Line, Fulton & Brodie, contractor, J. T. Brodie, spreadman.

Section 7, Missouri River to Salisbury, Mo., and Section 8, Salisbury to Mississippi River, under way. O. R. Burden Construction Co. Al Perry, spreadman at Carrolton, Mo.; river crossing field office, Hartford, Ill. Dick Jernigan, spreadman.

• **Progress Pacific Pipeline Co.**—1,100 miles, 24-in., planned, Odessa, Tex., to Los Angeles Harbor, Calif.

Rancho Pipe Line System.—455 miles, 24-in., under way, McCamey to Houston, Tex. Completion date late 1952. (Joint project with Sinclair Pipe Line Co., Pan American Pipe Line Co., Tidewater Pipe Line Co., Nantucket Pipe Line Co., Phillips Pipe Line Co., and Ashland Pipe Line Co. with Shell Pipe Line Corp. handling construction and operation.)

McCamey to Cedar Valley near Austin, Tex. Anderson Bros. Corp. A. Kilgore, spreadman at Menard, Tex.

(Segment 1)—Austin to Shell's Deer Park Refinery (Houston area). Oklahoma Pipe Line Constructors.

(Spread 1)—Brazos River west to Austin, Houston Contracting Co.

• **Roosevelt Oil & Refining Corp.**—22 miles, 4 and 6-in., planned, St. Helens to Norwich, Mich.

• **Service Pipe Line Co.**—16-in., planned, Bowie, Tex., to Drumright, Okla.

30 miles, 6-in., Knox and Haskell counties, Texas.

29 miles, 4-6-8-in., proposed, Natrona County, Wyoming.

170 miles, 12-in., proposed, Tioga to Williston, N. D.

Sinclair Pipe Line Co.—674 miles, 22-24-in., under way, Cushing, Okla., to East Chicago, Ind. Completion date 1952.

Section 1, Drumright-Cushing, Okla., area, to Humboldt, Kans. O. R. Burden Construction Co.

(Spread 1) Caney to Humboldt, Kans. A. B. Haynes, superintendent at Chanute, Kans.

(Spread 2) Cushing, Okla., to Caney, Kans. Floyd Lewis, spreadman at Hominy, Okla.

Humboldt, Kans., to Salisbury, Mo. R. H. Fulton & Co., contractor. M. L. Boyd and Jerry Nash, spreadmen.

Salisbury, Mo., to Forest City, Ill. O. R. Burden, contractor.

22-in. Forest City, Ill., to East Chicago, Ind., Britton Bros., contractor.

• **Sterling Pipe Line System.**—53 miles, 12-in., planned, Sterling, Colo., to connection with Platte Pipe Line at Gurley, Neb. (Includes 20 miles, 10-in., main line; 35 miles, 8-in., branch lines). Joint venture comprising Toronto Pipe Line Co., Shell Pipe Line Corp., and Texas Pipe Line Co.

• **Sun Pipe Line Co.**—34 miles, 8-in., planned, Jameson to Colorado City, Tex.

20 miles, 6-in., planned, Claytonville to Colorado City, Tex. Completion date 11-1-52.

• **Texas-Empire Pipe Line Co.**—30 miles, 18-in., planned, Wilmington to Lockport, Ill.

• **Toronto Pipe Line Co.**—100 miles, 6-10-12-in., planned, Merino, Colo., to Gurley, Neb. Completion date 10-31-52.

• **West Coast Pipeline Co.**—960 miles, 20-22-in., planned, Synder, Tex., to Norwalk, Calif.

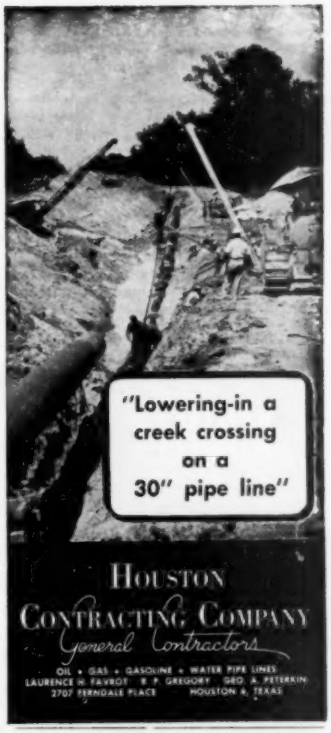
West Texas Gulf Pipe Line Co.—466 miles, 20-26-in., under way, Colorado City to Sour Lake, Tex. Anderson Bros. Completion date 1-1-53.

(1) Contracted, Middle section from Wortham toward Sour Lake, Tex.

(2) Henderson County to Longview, Tex.

Products Pipe Lines

• **Bell Oil & Gas Co.**—150 miles, 6-8-in.,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planned. Ardmore to Drumright, Okla. Completion date 6-1-53.

Buckeye Pipe Line Co.—370 miles, 8-12-16-in., under way, Linden, N. J., via Allentown, Pa., to Auburn, Syracuse, Waterloo and Rochester, N. Y. (Sections divided as follows: 75 miles, 16-in., 218 miles, 12-in., 77 miles, 8-in.). Completion of 16-in., 1952 balance 1953.

77 miles, 16-in., under way, Macungie, Pa. to Linden, N. J. H. L. Gentry Const. Co. F. K. Morris, spreadman at Manville, N. J. Completion date 10-15-52.

• **Coastal Products Pipe Line Co.**—260 miles, 20-in., proposed, Houston to Baton Rouge.

• **Harbor Products System**—86 miles, 16-in., planned, Philadelphia to Trembley Point, N. J. (Joint ownership of Sinclair Pipe Line Co., Gulf Oil Corp., and Texas Co.)

Indiana Farm Bureau Cooperative Association, Inc.—180 miles, 8-in., under way, Mt. Vernon to Indianapolis, Ind. R. B. Potashnick, contractor.

70 miles, 4-in., under way, Indianapolis to Peru, Ind. R. B. Potashnick, contractor.

Ohio Oil Co.—255 miles, 8-10-in., East St. Louis, Ill., to Indianapolis. Conyes Const. Completion date 11-52.

Phillips Petroleum Co.—50 miles, 8-in., under way, Goldsmith to Spraberry, Tex. McVean & Barlow. Completion date 12-52.

54 miles, 6-in., planned, Goldsmith to Borger, Tex.

52 miles, 10-in., planned, Shell's Brookshire system to Sweeny, Tex.

Phillips Pipe Line Co.—35 miles, 6-in., planned, Okmulgee, Okla., to Tulsa. Completion date 12-52.

Pioneer Pipe Line Co.—(Continental Pipe Line Co. and Sinclair Pipe Line Co.). 310 miles, 8-in., under way, Sinclair, Wyo., to Salt Lake City, Utah.

• **Progress Pacific Pipe Line Co.**—900 miles, 10-in., proposed, California to West Texas.

Salt Lake Pipe Line Co.—330 miles, 8-in., contracted, Salt Lake City to Boise, Idaho. Macco Corp., and Engineers, Ltd.

Shell Oil Co.—565 miles, 8-14-in., under way, Wood River via East Chicago to Detroit. R. B. Potashnick, contractor on Wood River—E. Chicago portion of project.

• **Sinclair Pipe Line Co.**—12-in., planned Sinco to Port Arthur, Tex.

• **Standard Oil Co. (Ind.).**—316 miles, 12-in., proposed, Sugar Creek refinery to Dubuque, Iowa. Completion date 1-1-53.

• **Standard Oil Co. (Ohio).**—17 miles, 6-in., planned, Toledo to West Toledo, Ohio.

Sun Pipe Line Co.—110 miles, 8-in., under way, Fostoria to Hudson, Ohio.

Tuscarora Oil Co.—27 miles, 12-in., under way, Allentown to Reading, Pa.

• **United States Pipe Line Co.**—1,600 miles, 14-22-24-in., proposed, Port Neches, Tex., to Newark, N. J. (Includes 560 miles, 25-in., Port Neches to Jackson, Tenn.; 120 miles, 14-in., lateral to Paducah, Ky., and 1,045 to Newark).

• **Wolverine Pipe Line System**—200 miles, 14-in., planned, Chicago to Toledo and Detroit. (Joint ownership of Shell, Texas, and Cities Service).

Natural-Gas Pipe Lines

• **Algonquin Gas Transmission Co.**—202 miles, 3 to 16-in., under way, Conn., R. I., and Mass. Associated Pipe Line Contractors and Williams Bros. Co. Completion date 10-20-52.

• **Allied Gas Co.**—24 miles, 6⅝-in., proposed, McLean to Champaign County, Illinois.

• **Arkansas-Missouri Power Co.**—140 miles, 2 to 10-in., planned, St. Francis River, Clay County, Arkansas, to near Campbell, Mo.

• **Associated Natural Gas Co.**—88 miles, Missouri.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

• **Chattahoochee Natural Gas Co.**—70 miles, proposed, Chattahoochee to Floyd County, Ga.

Cities Service Gas Co.—179 miles, 4-30-in., gathering system in vicinity of Ulysses, Kans. Vaughn & Taylor Construction Co., Inc. D. D. Vaughn, spreadman, Ulysses.

15 miles, 20-in., Craig County, Oklahoma, to Lawrence County, Missouri.

Cities Service Gas Co.—21 miles, 26-in., planned, Franklin and Anderson counties, Kansas.

• **Coast Counties Gas & Electric Co.**—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

Colorado Interstate Gas Co.—250 miles, 20-in., under way, Kit Carson, Colo., to Amarillo, Tex. R .H. Fulton & Co., contractor. Jerry Nash spreadman at Lamar, Colo.

Pueblo County to Fowler, Colo.

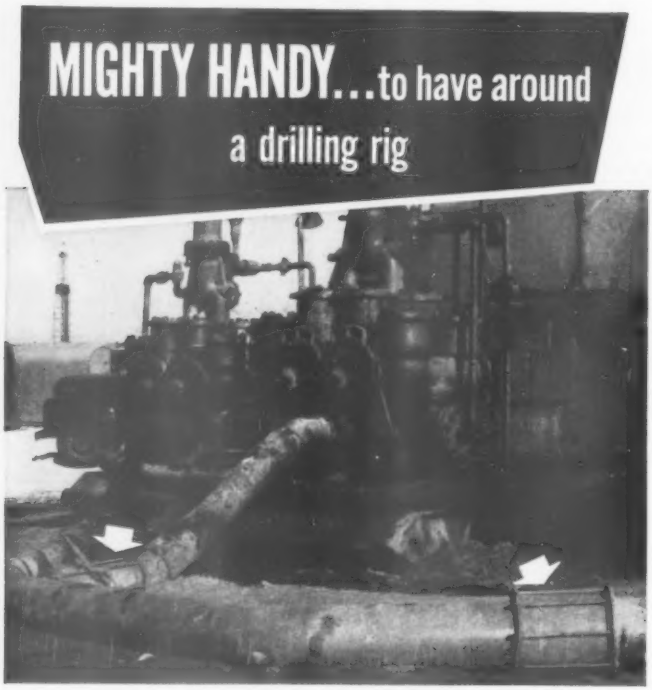
• **Commonwealth Natural Gas Corp.**—537 miles, 20-in., proposed, West Bend, Ky., to Norfolk, Va.

Dow Chemical Co.—70 miles, various sizes, Midland, Saginaw, and Bay City, Mich. Mahoney Contracting Co., contractor. Ralph Bucher, spreadman at Midland.

• **East Tennessee Natural Gas Co.**—172 miles, 22-in., planned, Greenbrier to Oak Ridge, Tenn.

100 miles, 16-in., proposed, Knoxville to Kingsport, Tenn.

• **El Paso Natural Gas Co.**—170 miles,



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planned, looping along main line in Texas, New Mexico, Arizona.

36 miles, 24-in., planned, looping from Kingman to Francomia, Ariz.

725 miles, proposed, Permian Basin, N. M., and West Texas.

181 miles, proposed, field transmission lines.

90 miles, proposed, main transmission line on San Juan Basin, N. M. to California.

• **Fredericksburg Natural Gas Co.**—29 miles, 3-4-in., proposed, Fredericksburg, Va. area.

• **Georgia Gas Co.**—32 miles, 4½-in., proposed, Bogart to Gainesville, Ga.

• **Glacier Gas Co.**—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

120 miles, 16-in., proposed, Spokane to Hanford, Wash.

91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

• **Gulf Interstate Gas Co.**—860 miles, 30-in., proposed, Acadia Parish, La., to Boyd County, Ky.

230 miles, 24-in., planned, gathering system in Rayne, La. area.

• **Home Gas Co.**—32 miles, 12-in., planned, Breesport to Union Center, N. Y.

17 miles, 12-in., proposed, loops from Hancock to Sanford, N. .

46 miles, proposed, Tioga and Broome counties, N. Y.

• **Hope Natural Gas Co.**—33 miles, 8-10-12-in., planned, Wyoming County, West Virginia, south to Buchanan County, Virginia.

Iowa-Illinois Gas & Electric Co.—41 miles, 10-in., planned, Washington County to Cedar Rapids, Iowa.

• **Kansas-Nebraska Natural Gas Co., Inc.**—179 miles, planned, Kansas and Nebraska.

18 miles, 6-8-in., planned, McCook, Neb., south. Completion date 1952.

54 miles, 4-6-in., planned, Neligh to Hartington, Neb. Completion date 1953.

20 miles, 12-in., planned, Atwood to near Oakley, Kans. Completion date 1952.

Kansas-Nebraska Natural Gas Co., Inc.—49 miles, 10-in., under way, Ogallala to North Platte, Neb. Engineering Const. Co. Completion date 1952.

• **Kansas Power & Light Co.**—27 miles, 20-in., planned, Pratt, Kans., to Calista compressor station.

28 miles, 12-16-in., planned, north of Kansas to Meade County gas field.

• **Lake Shore Pipe Line Co.**—75 miles, 10¾-in., under way, T.G.T. connection at Cochranton, Pa., to Fairport via Ashtabula, Ohio.

• **Lone Star Gas Co.**—100 miles, proposed, storage fields to the Dallas-Fort Worth area.

35 miles, 12-in., proposed, southeastern Schleicher County.

70 miles, 20-in., planned, Garvin County, Oklahoma, to Clay County, Texas.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington and Beaver counties, Pennsylvania.

• **Michigan Gas Storage Co.**—30 miles, 26-in., planned, Laingsburg Junction north.

• **MidSouth Gas Co.**—240 miles, proposed, Greene, Poinsett, Crittenden, St. Francis, Lee, Phillips, Monroe, Woodruff, and Cross counties, Arkansas.

• **Mississippi River Fuel Corp.**—98 miles, 16 and 18-in., planned, feeder line from Lincoln Parish, Louisiana, to Waskom field, Harrison County, Texas.

40 miles, 18-in., planned, Dubach to Perryville, La.

Missouri Central Gas Co.—25 miles, 6-in., contracted, Moberly to Macon, Mo. L. R. Young Const. Co.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin, Mo., northwest.

• **Montana Power Co.**—52 miles, 16-in., planned, Canada-Montana border to Cut Bank, Mont.

• **Morganfield Natural Gas Co.**—31 miles, 4-6-in., planned, through Sturgis, Providence, Clay, Diamond, Wheatcroft, and Sullivan, Ky.

• **Natural Gas Storage Co. of Illinois.**—43 miles, 30-in., proposed, Kankakee and Iroquois counties, Illinois.

• **Nevada Natural Gas Pipe Line Co.**—114 miles, 10-in., planned, Topock, Ariz., to Las Vegas, Nev.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia, to Narrows and Dublin, W. Va.

• **New York State Electric and Gas Co.**—59 miles, 8-10-24-in., proposed, Oneonta and Norwich to DeRuyter, N. .

New York State Natural Gas Corp.—104 miles, 14, 16, 20-in., under way, looping on Westmoreland, Armstrong, and Tioga counties, Pennsylvania. (Includes 17 miles, 16-in., in Potter County, Pennsylvania, and 21 miles 14-in., replacement in Line No. 507, New York.)

Utica to Amsterdam, N. Y. (to begin at completion of Zelienople). Williams-Austin. Howard Bauer, superintendent. Completion in 90 days.

Angelica to Rossburg, N. Y. (begin at completion of Cayuta-Ithaca). Williams-Austin. Howard Bauer, superintendent. Completion in 45 days.

Colesburg Junction to Sabinsville, Pa. (begin at completion of Angelica job), Williams-Austin. Howard Bauer, superintendent.

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Battery Ignition Applications. Opens battery circuit and sounds an alarm . . . sounds an alarm only . . . opens battery circuit only.

Magneto Ignition Applications. Sounds an alarm only . . . grounds dual magneto . . . grounds magneto only . . . grounds magneto and sounds alarm or lights signal light.

Dual Ignition Applications. Opens battery circuit and grounds magneto.

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Material Flow Lines	High Pressure Steam
Refinery Instrumentation	Textile Processing Equipment

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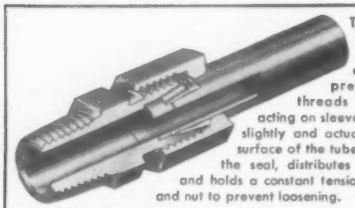

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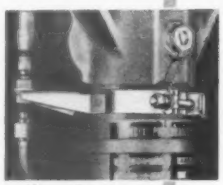

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21 miles, Columbiana and Stark counties, Ohio.

• **New York State Natural Gas Co.**—95 miles, 16-20-in., planned, Clinton County to Armstrong County, Pennsylvania.

(Section 1) 16-in., Clinton County, Pennsylvania.

(Section 2) 20-in., Armstrong County, Pennsylvania, begin 1953.

29 miles, 20-in., begin 11-1, looping from Tonkin Station to Kittanning, Pa. Williams-Austin Co. Completion date 12-15-52.

• **Northeastern Gas Co.**—411 miles, proposed, New England towns.

• **Northern Natural Gas Co.**—580 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska loops.

210 miles, 26-in., planned, five loops in Texas-Oklahoma area, two in Kansas, and two in Nebraska.

400 miles, 24-in., proposed, Emerson, Manitoba south to Red River Valley through Fergus Falls on to St. Paul, Minn.

102 miles, planned, extension.

Northern Natural Gas Co.—140 miles, 4-6-8-in., under way, south of Rolla, Kans., to Guymon, Okla. Reese Bros. Const. Co. E. H. Reese, spreadman at Hugoton, Kans.

• **Northern Indiana Fuel & Light Co.**—33 miles, 8-in., proposed, Edgerton to Auburn, Ind.

• **Northwest Natural Gas Co.**—750 miles, planned, Washington, Oregon, and Idaho.

24-in., Eastport, Idaho, to Monroe, Wash.

18-in., Monroe to International boundary near Lynden, Wash.

22-in., Monroe to near Seattle, Wash

20-in., Seattle to Portland, Ore.

• **Ohio Fuel Gas Co.**—31 miles, 20-in., planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and south western Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

• **Oklahoma Natural Gas Co.**—50 miles, 18-in., planned, Sapulpa to Choteau, Okla. 7-53.

20 miles, 8⅝-in., planned, Wewoka, Okla., south. 12-1-52.

• **Pacific Gas & Electric Co.**—50 miles, 12-16-20-in., planned, Fresno to Merced, Calif.

(Section 1) 16-in., Burrel to near Easton, Calif.

(Section 2) 20-in., Holm to Topock-Milpitas line.

(Section 3) 12-in., parallel existing Madera-Livingston line.

141 miles, 34-in., planned, parallel sections along Topock-Milpitas line.

Planned, Monterey to Fort Ord to Castroville; Napa Wye to Shellville; Cotati to Santa Rosa, Calif.

• **Pacific Northwest Pipeline Corp.**—1,384 miles, proposed, Ignacio, Colo., to Bellingham, Wash.

316 miles, proposed, laterals and spurs off main line to Pocatello, Idaho to Yakima, Wash.

Panhandle Eastern Pipe Line Co.—70 miles, 24-26-in., under way, looping from Sneed, Tex., to Emporia, Kans.

174 miles, 30 and 26-in., contracted. Tuscola, Ill., eastward—looping present system: R. A. Conyes, contractor.

26-in., Edgerton, Mich., Anderson Brothers.

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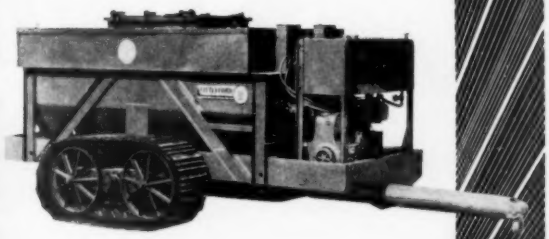

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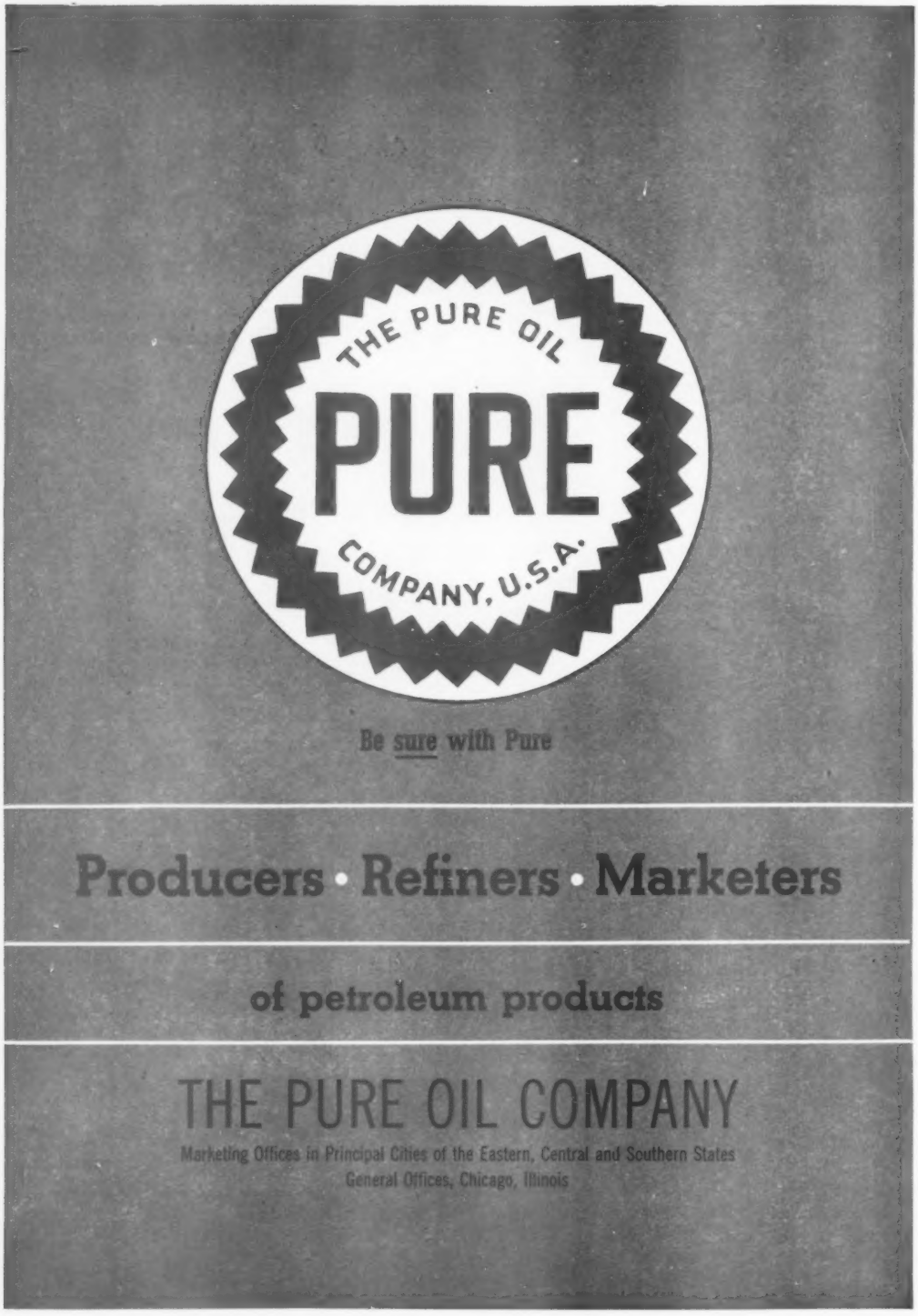
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30-in., looping in Tuscola, Ill.
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Pennsylvanian Gas Co.—52 miles, 12-in., between Warren and Erie, Pa. Section 1—27 miles, under way and contracted by Harford Brothers, Section 2—25 miles.

• **Peoples Natural Gas Co.**—25 miles, proposed, Cambria and Blair counties, Pennsylvania.

• **Permian Basin Pipeline Co. (Northern Natural).**—384 miles, 20-30-in., proposed, Permian Basin and eastern New Mexico to Skellytown, Tex.

Upton County, Texas, to Lea County, New Mexico.

Lea County to Roosevelt County, New Mexico.

Roosevelt County, New Mexico, to Carson County, Texas.

• **Phillips Petroleum Co.**—125 miles, 2 to 24-in., planned, Midland, Upton, Glasscock, and Reagan counties, Texas. Completion date 3-53.

28 miles, 10-in., planned, Bayou Plant to Adams Terminal. Completion date 7-53.

Phillips Petroleum Co.—65 miles, 4 to 30-in., under way, Goldsmith field system, Texas. George Tucker, const. Completion date 1-53.

75 miles, 4-30-in., under way, Upton and Reagan counties, Texas. Vaughn & Taylor, 11-52.

• **Public Service Co. of Colorado.**—95 miles, proposed, Douglas Creek and other gas fields to Grand Junction, Colo., area.

• **Public Service Co. of North Carolina.**—83 miles, 8-in., planned, Kings Mountain to Asheville, N. C. Completion date 3-1-53.

• **Rockland Light & Power Co.**—22 miles, 8-in., proposed, Orangetown to Tompkins Cove, N. Y.

• **Shenandoah Gas Co.**—39 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va.

• **South Carolina Natural Gas Co.**—160 miles, 16-12-10-in., proposed, Aiken, S. C., to cities of Columbia, Summerville, and Charleston, S. C.

• **South Georgia Natural Gas Co.**—339 miles, 2-12-in., planned, Phoenix, Ala., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga. (b) 10-in., Albany, Ga., to Moultrie, Ga. (c) 8-in., Moultrie, Ga., to Tallahassee.

• **Southern California Gas Co.**—35 miles, planned, Antelope Valley, California.

• **Southern California Gas Co. and Southern Counties Gas Co. of California.**—45 miles, 30-in., proposed, looping on line from Arizona border to Los Angeles.

81 miles, 30-in., proposed, Whitewater to Desert Center, Calif.

Planned, looping between Blythe and Colorado River and on westward of Indio.

• **Southern Natural Gas Co.**—1,235 miles, 24 to 4½-in., proposed, Louisiana, Mississippi, Alabama, and Georgia.

169 miles, loops, planned Ouachita Parish, Louisiana, to Augusta, Ga.; (20 miles in Ouachita Parish, 33 miles in Ouachita and West Carroll parishes; 7 miles, Sharkey County, Mississippi; and 108 miles, 14-in., Bass Junction to Augusta, Ga.)

Southern Natural Gas Co.—88 miles, 24-in., Mississippi and Alabama.

(1) vicinity of Louisville, Miss. Houston Contracting.

(2) Reform, Ala., to Warrior River. Houston Contracting.

• **Southern Union Gas Co.**—21 miles, 20-in., planned, Albuquerque, N. M.

27 miles, 10-in., planned, Lea and Eddy counties, New Mexico.

Southern Union Gas Co.—30 miles, 12-20-in., contracted, San Juan County, New Mexico. R. H. Fulton & Co.

• **Southwest Gas Corp., Ltd.**—26 miles,

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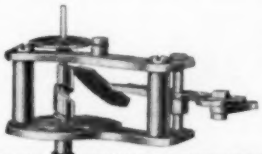

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proposed, from P.G.&E. line to Victorville, Calif.

Tennessee Gas Transmission Co.—591 miles, 24-30-in., under way, looping along present system (consisting of 323 miles of 30-in.; 167 miles of 26-in.; 101 miles of 24-in.)

420 miles, 30-in., Texas, Louisiana, Arkansas, Mississippi, Tennessee, and Kentucky.

101 miles, 26-in., Kentucky and Ohio.

304 miles, 24-in., proposed, Mercer, Pa., to Utica, N. Y.

202 miles, 20-26-30-in., proposed, Buffalo to Canada.

116 miles, 30-in., under way; three loops, from Refugio to Cleveland, Tex.; Oklahoma Pipe Line Constructors. Ed Flanagan, Victoria, Tex.

80 miles, 26-in., contracted, Harrison County to Jackson County, Ohio. H. C. Price & Co., contractor.

(Spread 1—Carrollton, Ohio, southwestward to Harrison County, Ohio. H. C. Price Co., contractor.

(Spread 2)—Athens, Ohio, to Jackson County, Ohio. H. C. Price Co., contractor.

126 miles, 30-in., under way, Arkansas, Louisiana, and East Texas. Houston Contracting Co.

(Spread 1) Gallion, La. Houston Contracting. W. H. Hayes, superintendent, M. L. Thompson, assistant superintendent.

(Spread 2) Eros, La., to Coldwater, La. Houston Contracting. F. A. Silar, superintendent.

(Spread 3) Sabine River south to Jasper Compressor Station. Houston Contracting. E. C. Norris, superintendent. R. E. Thornton, assistant superintendent.

(Spread 2) Under way, Marshall County to Tippah County, Mississippi. 9-10-52.

• **Texas Eastern Transmission Corp.**—315 miles, 24-in., proposed, Provident City, Tex., to Castor, La.

• **Texas Gas Transmission Corp.**—400 miles, 26-in., planned, looping from Bastrop, La., to Hardinsburg, Ky.

180 miles, 26-in., Acadia Parish to connection with existing facilities in Morehouse Parish.

35 miles, 12-in., Slaughters, Ky., to Evansville, Ind.

560 miles, 26-in., proposed, Louisiana and Kentucky.

Texas Gas Transmission Corp.—363 miles, 26-in., under way, Mississippi River near Greenville, Mississippi to Jeffersontown Station, Ky. H. C. Price Co. Charlie Ice, supt., at Cleveland, Miss. Completion date 11-15-52.

26-in., under way, Bastrop, La., to north of Mississippi River. E. C. Norris, superintendent. Houston Contracting.

• **Texas-Ohio Gas Co.**—1,435 miles, 30-in., proposed, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va. Completion date 6-30-53.

• **Union Oil Co. of California.**—40 miles, 8-10-in., planned, San Joaquin Valley and Los Angeles basin.

• **United Fuel Gas Co.**—50 miles, proposed, Wood County to Lanham, W. Va.

Planned, Lirette field to Harvey, La.

Union Gas Pipe Line Corp.—124 miles, Sterlington compressor station, near Monroe to Jackson, Miss.

23 miles, 8-12-16-in., South Louisiana facilities.

River Const. Corp., a joint venture including Oklahoma Contracting Co.; J. Ray McDermott & Co., Inc., and Morrison-Knudson. Inspection by Brown & Root, Inc.

• **United Gas Pipe Line Co.**—53 miles, 24-in., planned, Texas.

20-in., planned, Ship Shoals to Terrebonne Parish, Louisiana.

Virginia Natural Gas Co.—153 miles Buckingham to Richmond and Portsmouth, Va.

Westcoast Transmission Co., Ltd.—(See foreign natural gas pipe lines).

Western Kentucky Gas Co.—2 to 4-in. under way, additions to present system; Modern Welding Co., Inc., contractor.

• **Western Pipe Lines.**—1,200 miles, 22-in., planned, southern Alberta to Duluth, Minn.

• **West Texas Gas Co.**—16 miles, 16-in. planned, looping from Canyon to Happy, Tex. 11-1-52.

• **Wilcox Trend Pipe Line Co.** (Harry Bass Drig. Co.)—150 miles, various up to 20-in., planned, gathering system for delivery to proposed Texas Eastern terminal at Provident City, Tex.

Foreign Crude-Oil Pipe Lines

• **Basrah Petroleum Co.**—72 miles, 24-in., planned, Zubair to Fao. Begin May 1953.

Canadian Gulf Pipe Line Co.—115 miles, 4-6-12-in., under way, Big Valley and Fenn fields to Stettler field, Edmonton, Alta., Canada. Anderson International Contractors, Ltd.

• **Cia. de Petroleo Ganso Azul, Ltd.**—48 miles, 4-in., planned, Ganzo Azul field to Pucalpa on upper Ucayali River, Peru.

Creole Petroleum Corp.—143 miles, 26-in., under way, Ule (State of Zulia) to Amuay (State of Falcon). Williams Bros. de Venezuela, S. A., contractor of overland sections. general superintendent, Maracaibo. McWilliams, Gahagan, and Anderson Brothers, contractors of water crossings. Completion date March 1953.

• **Creole Petroleum Corp.**—25 miles, 34-in., planned, Lagunillas to La Salina (State of Zulia). Completion date April 1953.

Direccion General de Yacimientos Petroliferos Fiscales.—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Interprovincial Pipe Line Co.—100 miles, 16-in., contracted, Regina, Sask., to Gretna,

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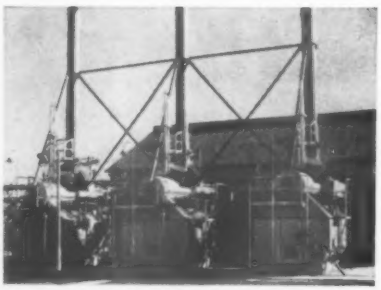

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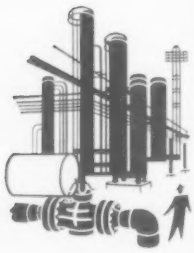

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Iraq Government.—135 miles, 12-in., from Iraq Petroleum Co. at Baija to Baghdad, Iraq. Construction 1952. M. W. Kellogg, contractor.

• **Mene Grande Oil Co.**—12 miles, 26-in., Anaco to Puerto La Cruz.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

• **Saskatoon Pipe Line, Ltd.** — 56 miles, 6-in., planned, Milden to Saskatoon, Sask.

Texas Petroleum Co.—60 miles, 4-6-in., under way, Pta. Nino to La Dorada.

Trans Mountain Oil Pipeline Co.—711 miles, 24-in., under way, Edmonton, Alta., to Vancouver, B. C. Canadian Bechtel, Ltd., engineers.

(Spread 1) Acheson to Lake Yellowhead. Comstock Midwestern.

(Spread 2) Lake Yellowhead to Blue River Comstock Midwestern.

(Spread 3) Vicinity of Vavenby, Mannix, Ltd.

Foreign Products Pipe Lines

Columbia Ministry of Petroleum—100 miles, 8-in., contracted, Contemplara to Pto. Salgar, Williams Bros. Corp.

75 miles, 4-in., planned, Buena Ventura to Cali, Colombia.

113 miles, 6-in., contracted, Puerto Berrio to Acededo near Medellin, Colombia, Carolina Construction Co.

• **Empresa Nacional del Petroleo**—80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

Empresa de Ferrocarriles Ecuatorianos.—50 miles, 6-in., contracted, Guayaquil to Palmira, Ecuador. J. A. Jones, contractor; C.R.C. Engineering Co., engineers.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtali, Southern Rhodesia.

Petrocongo (Sub. Cie. Financiere Belge des Petroles, S.A.).—225 miles, 6 in., under way, Ango-Ango to Leopoldville, Belgian Congo. Completion date 2-53.

Societe des Transports Petroliers par Pipe Line.—160 miles, 10-in., under way, Le Havre to Paris, France. Entrepose, contractor. Completion date 1953.

Trans-Northern Pipe Line Co.—440 miles, under way, Hamilton, Ont., to Toronto, Ont., to Montreal, Que., Canada. Contracted by Mannix-Williams Bros. Ltd.

Foreign Natural-Gas Pipe Lines

• **Azienda Generale Italiana Petroli.**—110 miles, 12-14-16-in., planned. Cortemaggiore to Genoa.

Azienda Generale Italiana Petroli — 90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

120 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, contractor.

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

Direccion General del Gas del Estado.—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

• **Empresa Nacional del Petroleo**—80 miles, 10¾-in., planned, Concon to Santiago, Chile.

• **Northwest Natural Gas Co.**—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

• **Petroleos Mexicanos.**—205 miles, 16-in., under way, Monterrey to Torreon, Mexico.

Petroleos Mexicanos. — 260 miles, 20-in., considered, Monterrey to Tampico and Poza Rica, Mexico.

Under way, Salamanca to Guadalajara, Mexico.

• **Petroleos Mexicanos, Mexican Gas Co., and Industrial Gas Co.**—600 miles, planned, Reynosa, Tamaulipas, to Tampico-Poza Rica, Mexico.

• **Trans-Canada Pipe Lines, Ltd.** (Canadian Delhi Oil Co.)—2,132 miles, proposed, Alberta to Toronto to Montreal.

Union Gas Co. of Canada, Ltd.—40 miles, 8-10-in., under way, Dawn Township to London, Ontario. F. E. Shaw, Ltd. Completion date 11-15-52.

• **Westcoast Transmission Co., Ltd.**—1,110 miles, 24-in., planned, Dawson Creek, B. C., through Pine Pass and Fraser River Valley to Kamloops, Princeton, and Vancouver to Portland. Ford, Bacon & Davis, engineers.

280 miles, 20-in., planned, Pincher Creek to Montana on to Spokane, Wash. Ford, Bacon & Davis, engineers.

138 miles, 20-in., planned, Sumas to Tacoma, Wash.

139 miles, 18-in., planned, Tacoma, Wash., to Portland, Ore.

• **Western Pipe Lines.**—833 miles, 24-in., proposed, from southern Alberta, eastward across the Canadian prairies, serving principal towns and cities along the route to a point near the International boundary.

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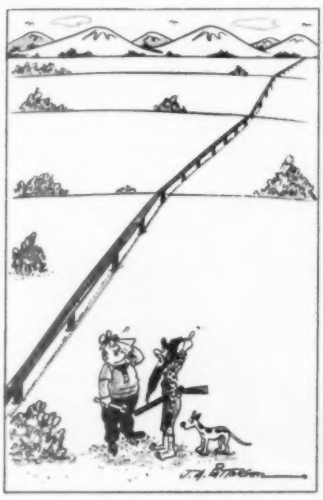

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TRADE LITERATURE

1 VERTICAL WET PIT CENTRILUGAL PUMPS is a 23-page bulletin covering two similar but functionally different types of vertical, centrifugal, wet-pit pumps, and heavy-duty bilge pump for handling solids-free liquids and drainage. Dimensions and selection charts are shown. *Yeomans Brothers Co.*

2 CMH FLEXIBLE METAL HOSE, a 32-page illustrated catalog, covers full range of Rex-Weld corrugated flexible metal hose, Rex-Tube convoluted hose types, and Rex-Flex stainless-steel flexible metal hose. Complete specification data are given. *Flexonics Corp.*

3 VERNON PIPE-CUTTING PANTOGRAPH is the latest catalog-bulletin which illustrates and describes this semiautomatic guided torch machine that produces straight or beveled cutoffs, saddle and insert-type tee intersection, lateral intersections, and miters up to 22½°. Also included is a list of standard equipment furnished, and parts list. *Vernon Tool Co., Ltd.*

4 THE ACCELATOR describes equipment that replaces, in a single unit, the previous multiple steps of mixing, coagulation, and sedimentation in the treatment of liquid containing solids. The 28-page booklet illustrates many industrial applications and includes specifications, operation data, characteristics, and design specifications. *Infilco, Inc.*

5 ASBESTOS SHEET AND GASKETS, an eight-page bulletin, is in reality a data sheet with engineers' drawings of sheet gasket material. *Durabla Manufacturing Co.*

6 VAREL EXPLORATION ROCK BITS. A series of five data sheets suitable for binding in a loose-leaf folder covers rock bits, blade bits, and a retipping and rebuilding service. Sheets include all engineering data and price information. *Varel Manufacturing Co.*

7 SOOT BLOWERS. Bulletin 1002 illustrates and describes Vulcan long retractable soot blowers with air and electric drives, suitable for travels of more than 20 ft., and capable of blowing with steam or air without change in original equipment. Rotating and traversing speeds are independently adjustable. *Copes-Vulcan Div., Continental Foundry & Machine Co.*

8 PV DRILL is a brochure which describes a new, efficient cutter developed for use with all models of Hillco tapping machines. Standard drill sizes 4, 3, and 2 in. Other cutter shapes and sizes available for use with special valves having restricted openings. *T. D. Williamson, Inc.*

9 TURBINE OIL RECLAIMER AND CONDITIONING SYSTEM. Bulletin R-275 introduces a new line of Hilco oil reclaimers which are direct connected to turbine reservoir or oil tanks for continuous operation, or to dirty and clean oil tanks for batch operation. Units are supplied in a single

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, Oct. 6, 1952

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self-contained package including all accessories such as pumps, motor, heater, and heat exchanger. *The Hilliard Corp.*

10 MODEL HMA MIDGET ANGLE GAS-ENGINE-DRIVEN COMPRESSOR is a 49-page colorful catalog, describing this compressor available in four models of 2, 4, 6, and 7 cylinders, with 80 to 330 b.hp. Catalog is widely illustrated showing this field compressor unit applicable to flare-gas elimination, pipe-line testing, field gas gathering, gas lift, repressuring, and recycling-plant feeders. Specifications, dimensions, horsepower, and capacity-curve charts are included. *Clark Bros. Co.*

11 UPSETTING OF TUBULAR AND SOLID STOCK FORGE WORK, a four-page bulletin, describes a service for upsetting of tubular and solid stock and forge work, as well as threading facilities available for A.P.I. pipe and tubing threads. *Abegg & Reinhold Co.*

12 AUTRONIC CONTROLLERS. A six-page, two-color bulletin gives a brief resume of the autronic principle, as well as a detailed description of the autronic control system as the first miniature all-electronic system for controlling pressure, temperature, flow, and level. Bulletin is illustrated with photographs, schematic diagram, and dimensional drawings. *The Swartwout Co.*

13 SPEED REDUCERS. Bulletin A-614-A offers in compact style full engineering information and selection data on the complete line of Dodge torque-arm speed reducers, and the new Dodge overload release, designed for use with the reducer. In addition to perspective illustrations of reducer and overload release, bulletin includes cross-section views and engineering diagrams showing proper positioning for installation. *Dodge Manufacturing Corp.*

14 ARMSTRONG STEAM TRAPS—AIR TRAPS. Bulletin No. 213 contains a sequence of diagrams explaining operating principle and design features of inverted bucket traps. Prices, physical data, and other details concerning cast semisteel, and forged-steel steam traps, and ball float air and air relief traps are also included. A full-page capacity chart shows actual continuous discharge capacities for all sizes of traps at various pressures. *Armstrong Machine Works.*

15 WILLISTON BASIN ABSTRACT TOWNSHIP MAPS is a handy pocket-size pamphlet describing abstract township maps of McKenzie County, North Dakota. Each map lists complete information as to land, lease, and important mineral ownerships, as well as important data on dry holes, producing wells, and current drilling operations. *Great Northern Map Co.*

16 PRESSURE-SEAL VALVES. New 16-page booklet describes pressure-seal stop, check, and nonreturn valves. Each type is furnished in sizes from 2½ to 14 in., and in 600, 900, 1,500, and 2,500-psi. pressure classes. Tables and charts for calculating pressure drop in any Edward stop, check, or nonreturn valve are provided to aid in valve selection. *Department NR, Edward Valves, Inc.*

17 B & W SCRATCHERS AND CENTRALIZERS is a new catalog and price list for "Gripper" woven wire slings. Included in its 15 pages are complete data on three major specifications to which the slings are made, information on recommended uses and loading data, and full listings of prices for standard sizes. *B & W, Inc.*

18 O-RING SLIDE-RULE DATA CHART, pocket-size and in accurate slide-rule form, covers both 6227 series and 6230 series O-rings for aiding hydraulic engineers to determine proper O-ring for their applications *Plastic & Rubber Products Co.*

19 PRESCRIPTION FOR PRODUCTION IMPROVEMENT TECHNIQUES is an informative brochure describing services for improving or increasing the production of oil or gas wells in any type of formation. Material covers acidizing, mud cleanout, Morflo, Hydrafrac, Acidfrac, Multifrac, gun perforating, and undesirable gas and water-elimination services. The 24-page, multicolored book is fully illustrated with both photographs and engineers' drawings. *Halliburton Oil Well Cementing Co.*

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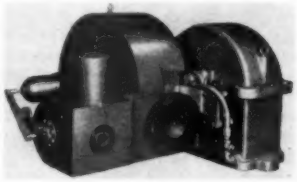
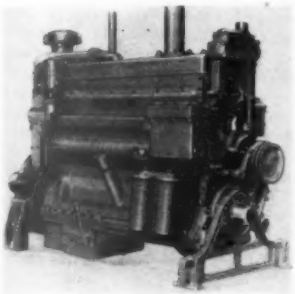
by Dan B. Miller

20 HIGH-SPEED REDUCTION GEARS for mechanical drive turbines. The new gears are available in built-in or coupled designs. Built-in gears include Elliott turbine and gear case firmly secured together, with turbine wheels and pinion mounted on the same sturdy, high-speed shaft. This eliminates exhaust-end bearing and coupling, permitting a compact unit of minimum over-all length. The coupled design is a self-contained gear unit which is flexibly coupled to a separate turbine drive. Both designs feature precision hobbed double helical gears, liner type sleeve bearings, special Kingsbury-type shaft seals, and self-contained forced-feed lubrication system. The new line of gears is offered in gear ratios up to 5 to 1 for built-in units; up to 8.5 to 1 for the coupled design. *Elliott Co.*



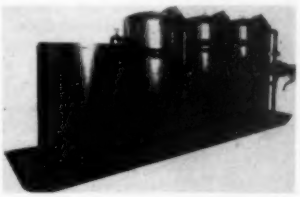
IT'S NEW ✓ CHECK IT

21 A NEW HIGH-SPEED DIESEL ENGINE is offered in industrial, electric set, and marine arrangements. D326 industrial engine features intermittent output rating of 170 hp. at 2,000 r.p.m. and weighs approximately 3,650 lb. Electric set has a 12-hour rated output of 80 kw. The set is available as a 50-cycle unit. D326 marine engine, on 24-hour, continuous duty, produces 118 hp. at 1,600 r.p.m. The basic D326 engine is six-cylinder and has a 5⅛-in. bore and 6-in. stroke. Pumps are mounted directly adjacent to the cylinders they serve, and the fuel lines made short and identical. These pumps, as well as the intake and exhaust valves, are actuated by a single camshaft. Piston cooling is by means of oil jets from under-mounted nozzles. *Caterpillar Tractor Co.*



IT'S NEW ✓ CHECK IT

22 AQUA-MATIC ION EXCHANGE PLANT for water conditioning on steam or power rigs, removes scale forming material such as calcium, magnesium, iron, and filterable solids. This portable filtering and softening unit eliminates the use of any chemicals in conditioning water for drilling boiler use. On five wells no boiler compound of any type was used. Available in various sizes and combinations for use on power rigs and other engine and boiler applications. It is skid mounted for complete portability. Only connections required are raw water supply and treated water connection to your equipment. Tanks are for 100 lb. working pressure with safety factor of 4. No shut down time required for cleaning and repair of boilers. *W. R. Henderson & Co.*



IT'S NEW ✓ CHECK IT

23 A NEW TYPE SPRAY PAINTING GUN has been developed for the application of the recently developed epon resin paints. A catalyst is mixed with this paint a split second before it strikes the surface. The blending of the paint and the catalyst is accomplished with a dual-feed head on the gun. Because of the rapidity with which the paint sets up after the catalyst is added, the two are blended after they leave the gun. The spray gun is essentially a heavy-duty production gun with the precision catalyst feed system added.

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

Keep Informed. Save Time. Tear Out Card. Check It. Mail It.

The exterior location of the catalyst nozzles lets the operator keep an eye on the flow of catalyst. The hook-up for the catalyst painting system consists of the gun; an air line, and lines for paint and catalyst; two pressure tanks; one for paint and one for catalyst; and gages and fittings. To assure a correct feed-ratio of catalyst to paint, the same air pressure is used on both the catalyst and paint tanks. All fittings in the system have standard pipe threads to speed hookup and transfer of equipment. *Binks Manufacturing Co.*

IT'S NEW CHECK IT

24 SHORT-HAUL MICROWAVE RADIO SYSTEM. A simple, compact microwave radio system operating over a frequency range of 940 to 960 megacycles, which will provide low-cost multiple channels for voice communication, telemetering, and remote supervisory and control functions, may be used for point-to-point communication over distances up to 300 miles, using a chain of repeater stations spaced at intervals of approximately 25 miles. The equipment serves terminal and automatic relay stations. It provides for simultaneous operation of five voice channels and one service channel. From 9 to 18 telemetering, remote control, or supervisory circuits may be substituted for each voice channel. The CW-5B is designed for unattended operation, and the equipment may be installed at locations which are inaccessible for periods of several months. It may be employed by oil, pipe line, and gas companies and other industries to replace existing wire or carrier-current systems. *RCA Victor Division of Radio Corp. of America.*

IT'S NEW CHECK IT

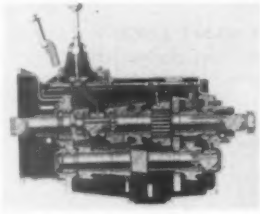
25 BLACKHAWK TRENCH HOG may be equipped with booms 3½, 5½ or 7 ft. in length for digging trenches of such depths. Two types of cutters are available for varying soil conditions. The standard, or slicer cutters are recommended for ordinary or sticky soils and are furnished in widths of 6 through 20 in. The super-service or disk cutters are used for digging extremely hard or rocky soils and frozen ground. These cutters are supplied in widths of 7 through 18 in. Optional features include a one-side dirt delivery attachment, a bulldozer for back filling, heavy duty power sprocket for deep and wide trenches, and a high-speed sprocket which affords speeds up to 300 ft. an hour when digging narrow, shallow trenches. The Trench Hog is easily installed on Ford or Ferguson tractors, requires no special transmission, employs heavy-duty 2-in. roller chain and has antifriction bearings at all critical points. *Arps Corp.*

IT'S NEW CHECK IT

26 PRESSURIZED VL EXTINGUISHER. A 1 and 2-qt. vaporizing liquid fire extinguisher designated as the Pressurized Model B, features fast, one-hand operation with accurate control. Aim, squeeze the grip, and a powerful 30-ft. fire-fighting stream is instantly released. The elimination of pumping or any other manual operation, enables the operator to aim a direct, on-target stream. The vaporizing liquid is completely discharged in 17 to 25 seconds by the positive force of odorless, nontoxic, moisture-free, pressurized nitrogen. The extinguisher is made with all-brass precision construction. To simplify inspection, cleaning, and recharging, the entire valve assembly and pick-up tube unscrew as a unit from the shell. The large valve unit opening in the dome also serves as the filler opening. A visual gage constantly shows the pressure condition. Effective extinguishing action is possible from any angle. *The Fyr-Fyter Co.*

IT'S NEW CHECK IT

27 MODEL 4-FS-1440 TRANSMISSION is designed for use in the biggest off-the-highway trucks up to 400 hp. Designed with closely spaced gear ratios, and high ratio of capacity to weight, the new unit makes new load-and-road performance possible in heavy hauling where conditions are unusually severe. With the converter, it brings the advantages of smoother load pickup, smoother climbing, elimination of shock load on engines, drive lines, and axles, and greater operator ease, to the biggest hauling units currently being developed. With four closely spaced forward speeds, operators have an ample selection of gears to match the widest range of operating conditions. The 4-FS-1440 has two SAE standard large power take-off openings, and may be fitted with speedometer gears. *Fuller Manufacturing Co.*



IT'S NEW CHECK IT

28 COPPER-CLAD STEEL PLATE, a new engineering material combining the special properties of copper and steel, is available in commercial quantities. Copper-clad steels are expected to meet a long-felt want for many electrical heat transfer, and corrosion applications requiring copper's high conductivity and corrosion resistance combined with steel's low cost, strength and rigidity. Applications will include electrical apparatus, evaporators, hot water heaters, heat exchangers, tube sheets, tanks, and vessels. Combining desirable chemical and physical characteristics with good fabrication properties, copper-clad steels

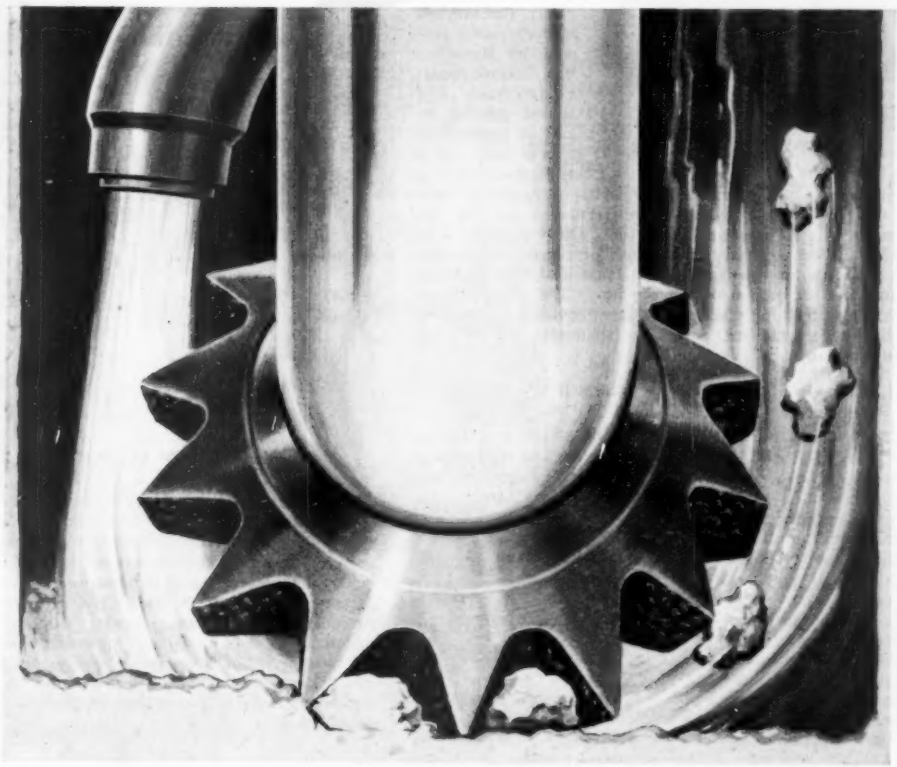
Better bottom hole cleaning means more footage per bit!

REED
TWIN-BLAST
ROCK BITS

REED Twin-Blast slush nozzles aim high-velocity streams of fluid directly at the bottom of the hole—blasting cuttings up into the return mud stream as quickly as they are chipped loose to let cutter teeth take a full "bite" on virgin formation.

The result—when correct mud velocities are supplied—is faster drilling, more hole per bit, fewer round trips and lower drilling costs.

REED ROLLER BIT COMPANY
Houston 1, Texas



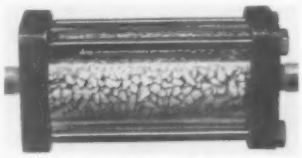
simplify problems of equipment and fabrication in many types of applications. Fabrication time can be cut considerably, cutting production costs. For many types of equipment a smaller thickness of copper-clad steel can serve the same purpose as a thicker section of solid copper, reducing material costs and saving space and weight. Available in plate gages only, Copper-Clad Steel consists of a layer of copper permanently and uniformly bonded to one side of a carbon steel backing plate. Cladding percentages of 10, 15, or 20 per cent of total plate thickness will be regularly furnished in plate sizes up to 120 in. with, 380 in. long and 3/16 to 1¼ in. thick. Copper-Clad steels are also available in flanged only or flanged and dished heads. *Lukens Steel Co.*

IT'S NEW CHECK IT

29 NEW 3,500-WATT A.C. ELECTRIC GENERATING PLANT. Conservatively rated, it has a 4,000-watt peak overload capacity for periods of up to 2 hours' operation. The Model 305CK has been designed to meet the demand for higher capacity in small-sized electric plants. The 115-volt, 60-cycle unit is powered by the Onan "CK," two-cylinder, four-cycle, air-cooled gasoline engine. A patented engine improvement gives this model an increased rated output of 500 watts over similar Onan "CK" powered models. Voltage regulation on this new model is plus or minus 3 per cent. The four-cycle "CK" engine used as prime mover built for rugged day-in, day-out service, and delivers its full rated load with fuel consumption of only 0.68 gal. per hour. The Onan-built revolving armature generator is direct-connected to the engine for trouble-free, permanent alignment. *D. W. Onan & Sons, Inc.*

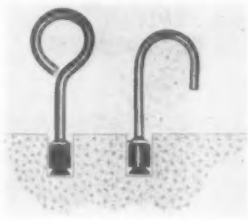
IT'S NEW CHECK IT

30 AIR LINE MOISTURE INDICATOR is for use in air or gas lines to give a positive visual indication of the presence or absence of moisture in the line. This unit consists of a pyrex glass cylinder filled with moisture sensitive blue granules, and end plates tapped for ¼-in. pipe. In operation the granules stay blue as long as the air leaving the indicator is dry, and turn pink when it contains moisture or water vapor. Four tie rods protect the cylinder against damage and permit disassembly for recharging with dry granules. All units with glass cylinder are factory tested at 100 psi. Moisture indicators with clear plastic cylinders can be furnished for higher pressures. Pressure drop is less than 1 in. of water at a flow rate of 5 cu. ft. per minute. *King Engineering Corp.*



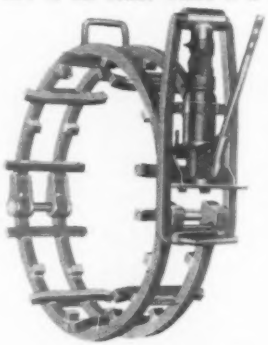
IT'S NEW CHECK IT

31 NEW PIPE BOLT AND EYE BOLT ANCHORING ASSEMBLY. The pipe bolt assembly is used for mounting conduit, gas and water pipe to masonry while the eye bolt assembly is used for anchoring guy wires to masonry. The assemblies consist of the pipe or eye bolt, lead sleeve, and cup-shaped steel anchor. After insertion of the assembly in masonry, the lead sleeve is mushroomed out by repeated blows on a special tamping tool. Continuing blows flatten out the steel anchor driving its ribbed steel edges into the walls of the hole. The steel anchor reinforces the lead sleeve providing a permanent solid anchorage that keeps pipe or eye bolts from loosening. The pipe bolt assembly replaces pipe straps, anchors, screws, and bolts. They can be obtained for ½, ¾ or 1 in. pipe. Eye bolt assemblies can be obtained in bolt lengths to 6 in., with a hole diameter of ½ in. *Super-Grip Anchor Bolt Co., Inc.*



IT'S NEW CHECK IT

32 NEW TIPTON HYDRAULIC LINE-UP CLAMP has the newly designed cross bars that put the pressure in the center where it is most effective and makes easy, quick, and accurate lineups. The clamp is tightened by an all-position hydraulic jack which gives the right amount of power providing for faster and better lineups. The lever releases the jack which is self-retracting. The hydraulic jack has a travel of 2¾ in. which makes it quick and easy to clamp around the pipe. *J. J. Tipton.*



IT'S NEW CHECK IT

33 A NEW OFF-THE-ROAD HIGH FLOTATION TIRE that provides positive traction in sand or loamy soil is the 65 in. 18-ply rating all-nylon wide base earthmover. The new high flotation tire is rounded to produce better flotation. In sand it operates at relatively low air pressures of 20 to 25 lb. Use of Nylon in cord body of the tire enables it to withstand flexing better than other cord materials. Tapered bead seats prevent slippage on rim at low pressures. Shallow type treads such as those designed into the new Earth Mover tire will not dig in and the equipment keeps rolling because of the high flotation. *B. F. Goodrich Co.*

IT'S NEW CHECK IT

OIL IN DRILLING FLUIDS DOESN'T BOTHER HYCALOGGERS...

. . . For Hycaloggers, with the experience of logging over 800 wells, have solved this problem. Their researchers in the Hycalog laboratories have produced the answer—a special technique which cleans cuttings thoroughly without affecting their composition, permitting full evaluation even when drilling fluids contain oil.

May we show you how Hycalogging* gives you the whole story on formations, under any drilling conditions.

Hycalogging is continuous hydro-carbon logging of cuttings, mud samples, and recovered cores.

WELL LOGGING
ON LOCATION CORE ANALYSIS
OFF LOCATION CORE ANALYSIS
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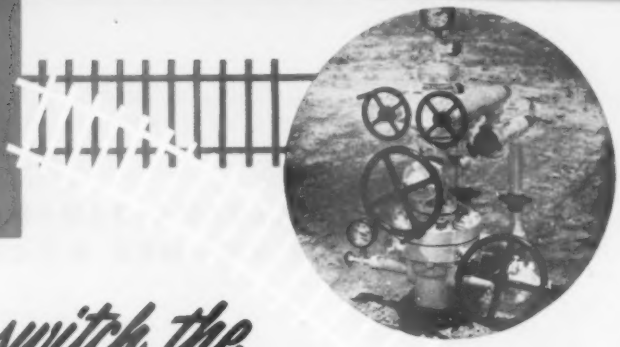
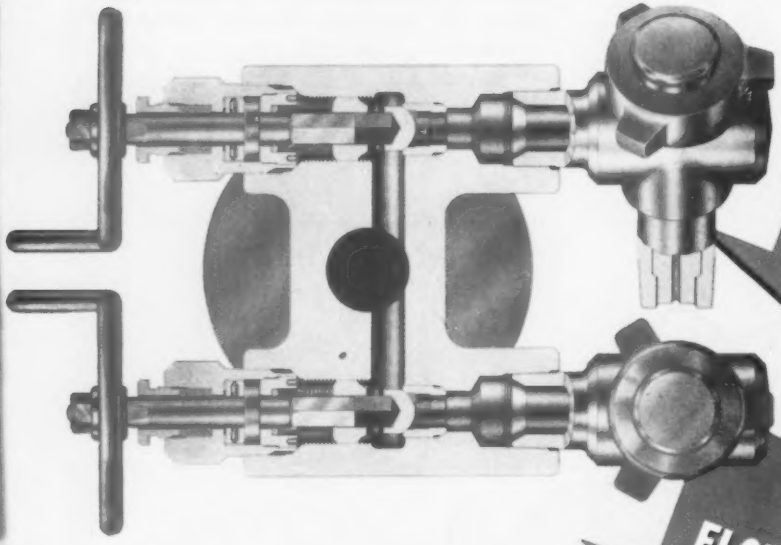


...you can switch the flow without closing in your well!



The New O-C-T DUAL FLOW CONTROL

High on the list of advantages which the new O-C-T Dual Flow Control brings to the field is the fact that the operator can switch the flow from one size choke to another without closing in the well and thus changing any of the well's production characteristics. This feature is extremely important when running pressure bombs, temperature surveys and other wire line instruments. Besides the O-C-T Dual is the only compact dual assembly on the market in which the operator can use positive choke beans of all popular makes.

Ask your O-C-T representative or write for details. The new O-C-T Dual Flow Control is now available through more than 700 supply stores.

IT REPLACES 13 DIFFERENT FITTINGS

- ...Reduces cost as much as 70%
- ...Reduces weight as much as 85%
- ...Uses any type positive choke bean
- ...Provides easy operation even at extremely high pressures

Oil Center Tool Co.

P. O. Box 3091 Houston, Texas

Export Representatives: Sterling Areas – Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston 1, Texas.

NATURAL GAS

OPS Undecided

Fogle says agency still pondering escalation ban

WASHINGTON.—Price-stabilization officials have decided that it's not yet time to call a meeting of the Gas Industry Advisory Committee to consider a proposal to restrict escalation clauses in gas-purchasing contracts.

E. E. Fogle, chief of the fuels and chemicals division of the Office of Price Stabilization, said he is still considering the recommendation of his petroleum branch on the escalation situation. Fogle's statement was made in reply to telegrams from producers and bankers protesting the proposed action.

The petroleum branch suggested an amendment to Ceiling Price Regulation 17 which would bar escalation clauses in gas contracts if the escalated price would be higher than the area ceiling price or 10 cents per M.c.f. at the well-head.

Fogle said the matter is still under consideration, and that he does not deem it advisable at present to call a meeting of the advisory committee.

He added that OPS would appreciate information on any contracts now in effect and negotiated prior to January 25, 1950, which contain escalation clauses that will raise the price of gas this year higher than the well-head ceiling price in the area.

Hearing Set on Proposed Gas-Price Hike in Hugoton

TOPEKA.—Heated arguments are looked for here October 20 when a hearing gets under way on an increase in the minimum price of gas at the well head in the Kansas portion of Hugoton gas field.

The Kansas Corporation Commission also has placed on the agenda for the hearing the task of defining "cubic foot" as related to measurement of gas in the state.

An increased price for Hugoton gas is being sought by the Southwest Kansas Royalty Owners Association and others as a result of price increases allowed in the field across the southern state boundary in Oklahoma.

The association is seeking a minimum field price of 14 cents per M.c.f. at a 16.4 psi. pressure base or a minimum of 12 cents per M.c.f. at 14.65 psi.

Adoption of the latter pressure would add about 1 cent per M.c.f. to the well-head price.

The commission has taken under advisement a motion by the association's attorney that all purchasing companies in the field be required to produce copies of their contracts so that complete price information in the field would be available.

Stanolind Producing Sulfur At Slaughter Field Plant

FORT WORTH, Tex. — Stanolind Oil & Gas Co. has started producing sulfur with its new recovery unit in Slaughter field, Texas.

The unit is operated in conjunction with the Slaughter natural-gasoline plant which was placed in operation 3 years ago. Both the gasoline plant and the sulfur unit are being operated by Stanolind for eight owner companies.

Construction of the recovery unit was launched in April by Fluor Corp. It is designed to process 8,750,000 cu. ft. of gas and to recover about 48 long tons of sulfur daily.

Natural Gasoline

Sales Surging

Brennan forecasts yearly gain of 10-to-15 per cent

TULSA.—Sales of liquefied petroleum gas are expected to increase between 10 per cent and 15 per cent a year for the next 5 years, G. L. Brennan, manager of the L.P.G. division of Warren Petroleum Corp., told a joint conference of L.P.G. shippers and railroad-traffic men.

The meeting, sponsored by the Natural Gasoline Association of America was held in Tulsa on September 26 to stimulate an exchange of ideas on problems of both L.P.G. shippers and the railroads.

Brennan told the group that it is feasible mechanically to increase propane production at existing plants about 25 to 30 per cent but that much of this potential may not come on stream because of the present price structure and the heavy tax load.

He also explained that the competition with rail movement by trucks, pipe lines, and by water will depend to a large extent upon rail freight rates in certain areas.

Importance of charges . . . W. A. Baden, president of Anchor Petroleum Co., in a discussion of the common interests of the two groups, emphasized the fact that the creation of new and greater markets for L.P.G. is influenced by delivered costs.

He estimated that the weighted-average freight charge on a gallon of L.P.G. is equivalent to the value of the product at manufacturing point. He forecast that by next spring the L.P.G. industry will provide one-fifth of all petroleum railroad traffic.

The effect of L.P.G. shipments on rail traffic in areas far removed from the principal producing areas of the Southwest is shown by the fact that L.P.G. shipments move an average of 950 miles compared with about 400 miles for other petroleum products.

Railroad viewpoint . . . A railroad man's view of the common problem was presented by T. M. Caizza, assistant to vice president, Santa Fe System Lines. He divided the over-all problem into two parts—storage and transportation. Partial solutions can be found in the expanding off-season market for L.P.G. and the increasing amount of underground-storage space.

"The development of adequate storage, strategically located, will go a long way toward solving the transportation problem," he said.

Caizza reported that L.P.G. shipments originating with the Santa Fe about tripled between 1947 and 1951. In the same period gasoline shipments declined.

L.P.G. Storage Approved

AUSTIN.—Stanolind Oil & Gas Co. has been granted permission by the Texas Railroad Commission to store L.P.G. underground in Three Bar (Devonian) field of Andrews County, Texas.

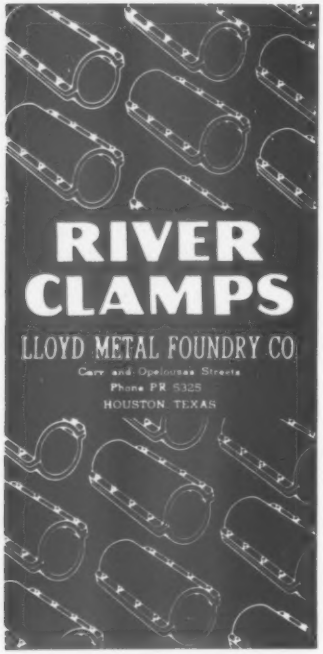
Products will be injected into a salt section from 17-2,700 ft.

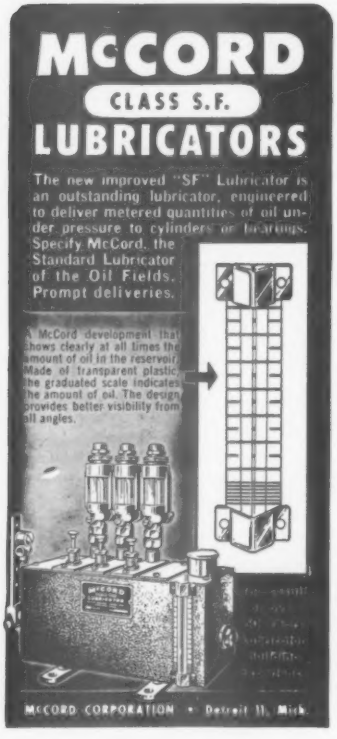
Salt water used to leach out the cavity will be injected into the Santa Rosa formation at 1,140-1,500 ft.

Production Scores Big Gain

WASHINGTON.—The Bureau of Mines reports productive capacity of natural-gasoline and cycling plants in the United States at the beginning of this year was 811,596 bbl. daily—an increase of 163,691 bbl. daily in 2 years.

In spite of the enlarged capacity, however, the number of operable plants declined from 554 to 521. This was due principally to the abandonment of a large number of small compression plants in Pennsylvania and West Virginia. The number of absorption plants increased by 13.




McCORD
CLASS S.F.
LUBRICATORS
The new improved "SF" Lubricator is an outstanding lubricator, engineered to deliver metered quantities of oil under pressure to cylinders or bearings. Specify McCord, the Standard Lubricator of the Oil Fields. Prompt deliveries.
McCord development that shows clearly at all times the amount of oil in the reservoir. Made of transparent plastic, the graduated scale indicates the amount of oil. The design provides better visibility from all angles.
McCORD CORPORATION • Detroit 11, Mich.

PIPE LINES

Expansion Wind-Up

Tennessee Gas completes 1952 construction work

HOUSTON.—The 1952 construction and expansion activities of Tennessee Gas Transmission Co. are now virtually completed.

Costing, according to Federal Power Commission figures, an estimated $59,000,000, the new facilities add 110,000 M.c.f. daily to the firm's transmission capacity. Total deliverability now stands at 1,310,000,000 cu. ft. per day.

Approximately 528 miles of pipe line were laid parallel to the firm's existing system in Texas, Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, and Ohio as a part of the 1952 expansion program.

In addition, 16 existing compressor stations were enlarged, and four new stations were built in Ohio, Pennsylvania, and New York. The compressor-station work added 93,900 hp. to the system, raising the total to more than 468,000 hp.

Tennessee Gas is one of the nation's largest gas-transmission companies, and its 2,000 miles of pipe line from the Rio Grande to New England make it operator of the nation's longest pipe line.

Where it was laid . . . Pipe laid this year included 82 miles of 26-in. in Ohio and 21 miles in Kentucky and 425 miles of 30-in. in Kentucky and the other states along the right-of-way. Contractors included Oklahoma Contracting Co., Houston Contracting Co., Anderson Brothers Corp., Western Pipe Line Constructors, Inc., and H. C. Price Co.

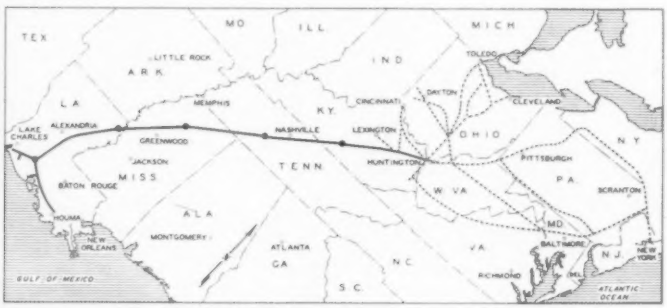
Bechtel Corp. constructed three of the compressor stations with their auxiliary buildings, water reservoirs, and employe dwellings. At each station, five or six 1,000-hp. engines or larger were installed, for a total of 25,520 hp. This was augmented by the 68,380 hp. installed as additional capacity in the existing 16 compressor stations.

Plans . . . With the 1952 construction now completed, Tennessee is making plans for future construction to bring the line up to the FPC authorized capacity of more than a billion and a half cubic feet daily.

This will involve laying about 591 miles of 24-in., 26-in., and 30-in. parallel loop lines along the existing system and 304 miles of 24-in. transmission line from the Mercer, Pa., area to a point near Utica, N. Y. Also authorized is an additional 137,000 hp. in existing compressor stations and 28,000 hp. in new stations, as well as about 250 miles of miscellaneous lateral lines.

El Paso Will Refile Plans For Huge Capacity Expansion

EL PASO, Tex.—El Paso Natural Gas Co. revealed last week it will refile its application, turned down late



Something New in Transmission

The first major trunk line to carry natural gas on a fee basis now is before the Federal Power Commission for approval or rejection. The $128,000,000, 860-mile line would carry about 375,000,000 cu. ft. of gas per day initially for the account of Columbia Gas System, Inc. It would be delivered to United Fuel Gas Co., a Columbia subsidiary, at a point near Huntington, W. Va. Route of the line is shown here in black. Dotted lines represent systems and service area of Columbia affiliates. Dots denote approximate location of the five planned compressor stations.

in September by the Federal Power Commission, to spend $176,000,000 to step up its natural-gas delivery capacity by 400,000,000 cu. ft. per day.

El Paso filed for approval of the huge program about the middle of September *(The Oil and Gas Journal, September 22, page 166)*. In turning thumbs down, FPC said the dual applications did not comply with commission requirements in many respects but particularly was lacking in exhibits relating to a description of the proposed operation, gas reserves, revenues, and rates to be charged.

The program involved laying about 822 miles of main-transmission line loops.

Vickers' Products Line in Kansas Gets Fast Write-Off

WASHINGTON.—The Defense Production Administration has approved for accelerated amortization Vickers Petroleum Co.'s new products line from Potwin to El Dorado, Kans.

Fast write-off was granted for 25 per cent of the $315,000 project. The 8⅝-in. line runs from Vickers' refinery at Potwin 15 miles to a connection with Great Lakes Pipe Line Co.'s terminal facilities at El Dorado.

DPA also approved a new $265,800 crude pipe line being built by Phillips Petroleum Co. at Slaughter, Tex., for accelerated amortization of 25 per cent of the investment, and a natural-gas-transmission line being built by Delhi Pipeline Corp. in Matagorda, Jackson, and Victoria counties, Texas, for amortization of 40 per cent of $1,293,465.

Pipe-Line Briefs

The Eleventh Naval District revealed last week that the Navy is planning a 25-mile products line from Norwalk, Calif., to the Marine Corps air station at El Toro. The line will carry aviation gasoline from bulk storage at Norwalk.

Max Weiner, president of Weiner Brothers, has announced purchase by the company of 34 miles of gas lines in Pennsylvania, West Virginia, and Ohio. The pipe includes 8 miles of 12-in., 5 miles of 10-in., and 21 miles of 8-in. Recovery or salvage will commence within about 30 days.

Rate for completion of Salt Lake Pipe Line Co.'s Salt Lake-to-Boise products line has been moved up a month to December 1. C. E. Finney, Jr., president of the company, said steel shortages had been expected to delay the project but that the production outlook now appears brighter.

● IT'S PERRAULT BROTHERS for coating and wrapping machines that give trouble-free service in applying all types of coating and wrapping specifications. The machines are available in line traveling or stationary types for all pipe sizes. For information or service contact —

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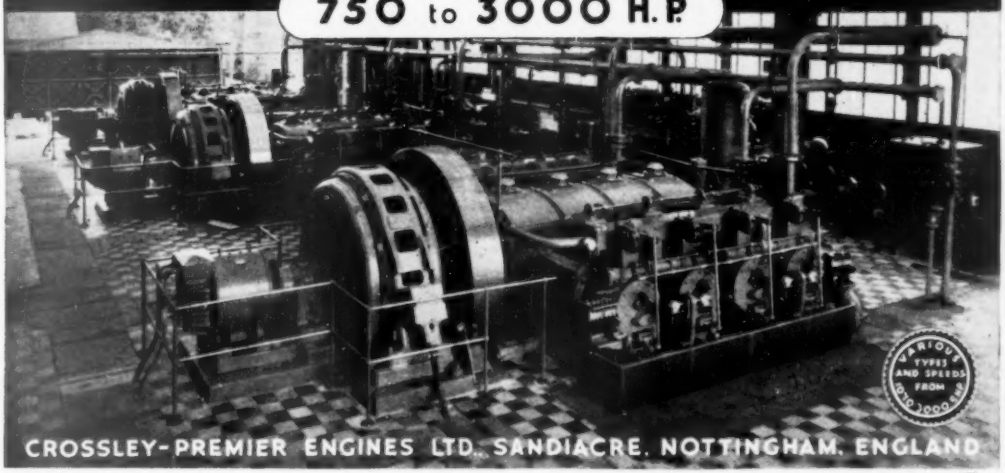

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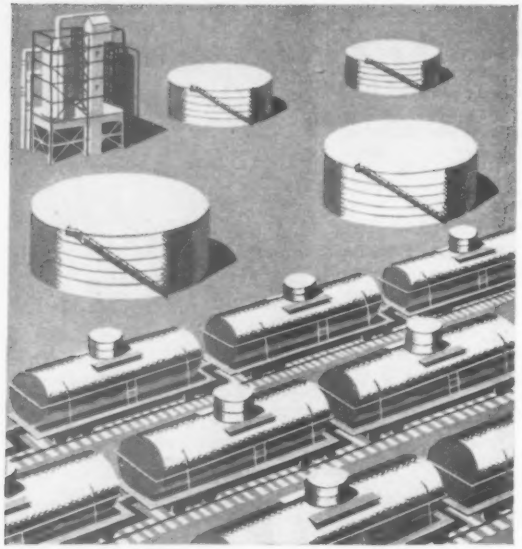

More Octane Barrels

EXTRA BARRELS OF HIGH QUALITY GASOLINE FOR THE REFINERY POOL CAN BE HAD THROUGH THE USE OF FILTROL'S LOW COST CRACKING CATALYSTS.

AS SHOWN IN THE EXAMPLE BELOW, HIGHER YIELDS OF CATALYTIC NAPHTHA, GREATER UTILIZATION OF BUTANES FOR PRESSURED GASOLINES, AND THEREBY INCREASED TOTAL GASOLINE YIELDS, ARE POSSIBLE WITH FILTROL CATALYSTS.

REFINERY GASOLINE PRODUCTION

CATALYST	FILTROL FLUID "58"			FILTROL SR			SYNTHETIC SILICA ALUMINA		
GASOLINE	B/D	RVP	BON*	B/D	RVP	BON*	B/D	RVP	BON*
STRAIGHT RUN AND THERMAL	10,000	77.0	68	10,000	7.0	68.0	10,000	7.0	68
REFORMED NAPHTHA	1,792	5.0	84.1	1,790	5.0	84.2	1,873	5.0	82.6
CAT-GASOLINE	6,700	4.9	90.5	6,620	7.0	91.5	6,300	7.0	92.5
POLYMER	950	2.5	110	950	2.5	110	950	2.5	110
BUTANE	1,384	68.0	105	1,137	68.0	105	1,127	68.0	105
BLEND	20,826	10.0	81.0	20,497	10.0	81.0	20,250	10.0	81.0

*Blending Octane Number (Research Method)

THESE EXTRA OCTANE BARRELS MEAN EXTRA DOLLARS; AVAILABLE TO CATALYTIC CRACKING OPERATORS EVERYWHERE THROUGH FILTROL CATALYSTS.

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*T. M. REG. U. S. PAT. OFF.

REFINING

Shale-Oil Cracker

Contract let for design of 50-bbl. demonstrator

WASHINGTON.—The U. S. Bureau of Mines has let contract to Catalytic Construction Co., Philadelphia, for process and engineering design of a new catalytic refining unit for the government's oil-shale demonstration plant at Rifle, Colo.

Catalytic's bid was $36,000, plus a fixed percentage of salary overhead to cover such expenses as facilities, equipment, and supplies used by the contractor's employes.

The new unit will be used to demonstrate the refining of shale-oil distillates by catalytic means in reforming and treating processes. Engineering and design for the 50-bbl. unit will be furnished by Catalytic following processes developed by the bureau. Work already is under way on the project at the company's offices here.

Construction contract . . . Boyd Guthrie, chief of the bureau's oil-shale demonstration branch, said construction contract for the unit will probably be let in the 1953 fiscal year.

The experimental catalytic unit, Guthrie said, will recover better yields (up to 25 per cent) of specification-grade gasoline, diesel fuels, and jet fuels from the shale-oil distillates now produced at the Rifle thermal refining unit. It also will permit production of higher-quality products at a lower cost, he said.

The new unit will be designed to process a variety of charge stocks, with or without hydrogen, over a wide range of experimental conditions. Objectives are to (1) remove the undesirable sulfur, nitrogen, and oxygen compounds that exist in shale-oil distillates or convert them to such forms that they can be readily removed and (2) effect molecular rearrangement or alteration of the hydrocarbons to improve product quality.

PAD Pushing For Higher-Quality Avgas Base Stocks

WASHINGTON. — The Petroleum Administration for Defense is asking refiners to take steps to improve the quality of avation-gasoline base stocks in order to secure expanded production of seriously short avgas.

PAD's J. Ed Warren said a substantial portion of the base stocks, high-quality automotive gasolines, now being blended with alkylate and other components to make avgas, is below a blending index number of 90. If a percentage of these base stocks could

NELSON REFINERY CONSTRUCTION INDEX

Appears in the first issue each month.

Explanation—"New Items That Appear in Quarterly Cost Indexes," July 7, 1952, pp. 105 and 106.

Compiled by W. L. Nelson, Petroleum Refinery Consultant, Tulsa.

Indexes of Individual Equipment Items—January, April, July and October.

INDEX (1946 = 100)

	1948	1949	1950	1951	June 1952
Pumps, Compressors, etc.	127.0	135.9	138.2	155.9	155.6
Electrical Machinery	127.6	130.9	134.9	154.3	152.3
Internal Combustion Engines	116.9	124.8	126.0	146.1	145.8
Instruments	120.0	122.0	127.8	142.3	142.4
Heat Exchangers	130.0	133.0	140.0	152.0	163.0
Miscellaneous Equipment Average	122.1*	121.6*	126.2*	145.1*	151.8
Materials Component	139.3	143.6	149.3	164.0	162.5
Labor Component	128.0	137.1	144.0	152.5	160.5
Refinery Construction Index	132.5	139.7	146.2	157.2	161.3

*Used in computing the Nelson Index until April 1925. These are slightly different than the average of the Miscellaneous Equipment Items shown above.

Let our horizontal Boring Equipment come to *your* rescue

We specialize in removing excess circumferencial weld material inside Pipe Lines so that a "go devil" under air pressure can be used to clear out surplus oil.

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At your Service In Any Part of the World.

General Descaling CO. LTD.

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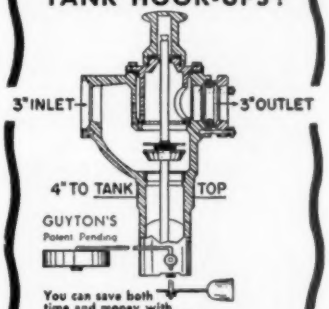

You can save both time and money with this stock tank routing valve with these outstanding features —

1. Save cost of labor and material on original hook-up.
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3. Prevent fire hazards of overflowing tanks.
4. Save checking of pipe line strapping.
5. Eliminates overflow line.
6. Eliminates manifolding line.

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ZERO HALF-HOOD *(shown above) Covers head and ears. Available in medium and large sizes.*

ZERO FULL-HOOD *Full neck protection from icy winds, rain, sleet. Medium or heavy weight in medium and large sizes.*

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1932-1952
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be replaced with higher quality stocks, avgas output could be expanded, he said, because less alkylate (also critically short) would be required for a given amount of such gasoline.

Avgas producers have been asked to advise PAD as to the volume of additional high-quality base stocks they can produce and the cost of incremental quantities of aviation gasoline manufactured from the higher-grade material.

Refiners who have facilities for producing these base stocks but who do not manufacture avgas have been asked to indicate the volume, quality, and the cost of improved base stocks which might be made available to producers of aviation gasoline.

Jefferson Launches Work on New Research Laboratory

AUSTIN.—Jefferson Chemical Co., Inc., has started construction of a new $500,000 addition to its research laboratory facilities here.

The new facilities will expand materially the investigation of petroleum-based chemicals carried on at the laboratories, the company said. Its decision to increase the tempo of its research activities was based partly on its successful introduction of several new chemicals during the past year.

The larger of two buildings ultimately will provide bench-scale research facilities for about 50 chemists, to be employed gradually over the post-construction period. The smaller building will add to present office and library space.

California Standard Awards Contract for Phenol Plant

SAN FRANCISCO. — Standard Oil Co. of California has let contract for construction of a $4,000,000 phenol plant at its Richmond, Calif., refinery to Stone & Webster Corp.

Actual construction of this the West's first such plant will get under way early next year and is scheduled for completion by about the end of the year.

The plant will use a recently developed synthesis process requiring neither sulfuric acid or chlorine. Principal uses of phenol are in the manufacture of resins for moulded plastic parts.

Federal Oil-Tax Collections Near Total For All of 1951

WASHINGTON. — Treasury revenues from the four federal oil taxes topped the $600,000,000 mark for the year ending in August, almost as much as was collected in all of 1951.

The monthly Internal Revenue Bureau report shows that in the first 8 months of the year the government took in $534,154,365 from the gasoline tax against $381,816,105 in the same period last year; $66,913,257 from lubricating oils against $60,134,416; $22,478,119 from pipe-line transportation against $18,525,571, and $9,749,896 from the new tax on diesel oil.

Collections for the month of August alone came to $74,180,848 from gasoline against $64,817,497 last year; $6,056,514 from lubricating oils against $9,730,076; $1,998,183 from pipe-line transportation against $2,498,060; and $1,202,609 from diesel oil.

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Plug Valve Lubrication

SYSTEM

The saving in labor alone usually pays for it in 60 days! With the inexpensive DELTA-DESCO SYSTEM an operator can lubricate 10 to 15 valves in the time usually required to lubricate one—and do the job better!

The DELTA-DESCO SYSTEM combines Delta Gun Fittings (or Automatic Lubricator), High Pressure Gun, Desco Specialized Lubricants, and Engineering Service. You stock only half as many DESCO Lubricants—3 Standard and 1 Special—that's all you need.

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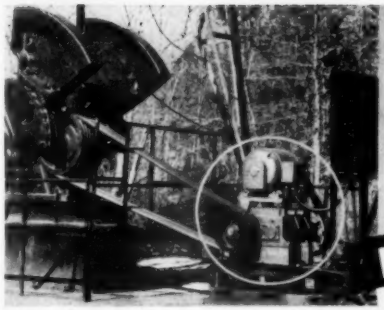

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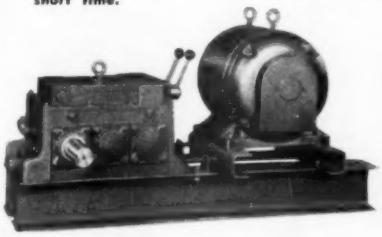

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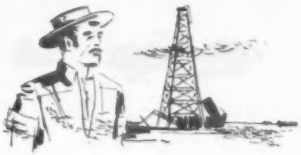

In Open-Hole Shooting . . .

RESULTS COST LESS WITH WELEX TORPEDO-JETS!

When Welex developed the 5⅝-inch TORPEDO-JET in 1948 it was the first real improvement in 50 years in the technique of open hole shooting. Since its introduction to the oil industry this tool has been cutting costs and increasing productivity for thousands of well operators.

Welex engineering research is continuously improving the effectiveness of TORPEDO-JET shooting and other Welex services. Better methods and equipment are important extras you get when you call on Welex for jet perforating services.

Ask your Welex service engineer about applications of the powerful, versatile TORPEDO-JET process in open hole shooting and other problems.

ACCURATE SHOOTING IN SPECIFIED ZONES

EXTREME PENETRATION

LARGE HOLE DIAMETER

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Drilling Contractors

Decline in Active Rigs Is First in Over Month

Active rotary rigs in the United States and western Canada during the week ended September 29 totaled 2,614, a decline of 21 from the number reported during the preceding week. It was the first week since the middle of August that there has not been an increase. Greatest declines were in the West Texas area, which lost 17 rigs, and in Oklahoma, which had 12 fewer rigs running than during the previous week. Active rigs by areas follow:

ACTIVE ROTARY RIGS*

(United States and Western Canada)

Area	Week ended 9-29-52	Change week ended 9-22-52	Change week ended 10-1-51
Gulf Coast	518	+ 3	— 81
N. & W. Tex.-N.M.	718	—17	—261
Ark.-N.La.-E.Tex.	132	— 6	— 32
Oklahoma	323	—12	+ 3
Kansas-S. Nebraska	167	+ 9	— 27
Illinois-Eastern	152	— 4	— 3
Rocky Mountains	256	+ 4	+ 58
Pacific Coast	161	+ 1	— 19
Total U. S.	2,427	—22	—362
Western Canada	187	+ 1	+ 28
Total	2,614	—21	—334

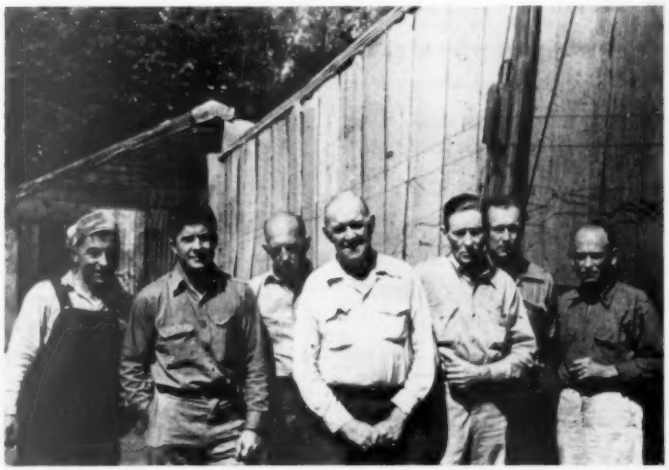
*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Rocky Mountains and Western Canada areas are shown on pages 192 and 193.

Grace Drilling Co., Houston, has a rig on a wildcat test 2 miles northeast of the Hosston townsite in Caddo Parish, northwestern Louisiana, where it is drilling for J. Collier Hurley and M. T. Halbouty, also of Houston. Hurley is one of the owners of the drilling company. The test, projected to the Rodessa formation, is 1 Dominick. Location is in 7-22n-14w.

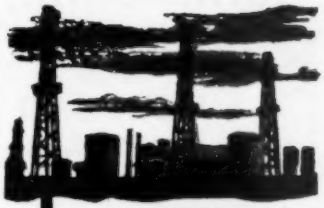
Crow Drilling Co., Inc., Shreveport, has the contract for a 6,500-ft. Eagle Mills wildcat test which McAlester Fuel Co. and associates are starting about 5 miles south of Prescott, in northern Nevada County, Arkansas. The operation is 1-A Buchanan with location in the C NW NW 33-11s-22w.

Circle Drilling Co., Lake Charles, La., has the contract for an 8,000-ft. Wilcox test which Bates & Cornell are undertaking at a wildcat location, 1 Snowden, Jr., in 22-3n-5e, 9 miles northeast of Marksville, Avoyelles Parish, Louisiana.

Precision Drilling Co., Ltd., Calgary, is moving its rotary rig from a recently completed wildcat test in the Eagle Butte area of Alberta Province, Canada, to another rank wildcat location in southwestern Saskatchewan Province,



Acme Drilling Co., Mount Pleasant, Mich., has the distinction of being the contractor on the world's deepest cable-tool test, located in Van Etten Township, Chemung County, New York, and now drilling below 10,666 ft. (see story in news section, this issue). Shown at the test, being drilled for New York State Natural Gas Corp., are, left to right: Paul Stout, tool pusher, operating company; Clyde Haupt, district supervisor, contracting company; Fred Landon, tool dresser; Clarence Erickson, driller; Joe Farley, tool pusher; R. D. Patterson, superintendent, northern district, operating company; and Stanley Bashline, driller.



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PETROLEUM DISTRIBUTING COMPANY

BOX 303 - HOUSTON, TEXAS - CHarter 5648

Quality Oil Field Lubricating Oils and Greases

where it has a contract for a test to be drilled for Royalite Oil Co. The new location is approximately 25 miles east of the Coleville field. It is at 1 Plenty, in LSD 11, 33-31-19w3.

Tiger Drilling Co., Oklahoma City, has a contract with Ashland Oil & Refining Co. for a wildcat test to be drilled in the Luther area of Oklahoma County, Oklahoma. Hole, now under way, is projected to 5,200 ft., which should carry it to the top of the Mississippian. Location is in the SW NW SW 22-14n-1e, just north of the Luther townsite. Test is listed as 1 Meyer.

Sunnyland Contracting Co., Rayne, La., has contracted for a wildcat test to be drilled for Cecil R. Haden in Okaloosa County, northwestern Florida. The test, 1 McCart, located in the C NE NE 30-4n-24e, is projected to 6,500 ft., or 200 ft. into the Lower Cretaceous.

Can-Tex Drilling Co., Calgary, has a rig working on a contract with Tide Water Associated Oil Co. and Imperial Oil, Ltd., at a rank wildcat test 85 miles southeast of Regina, in southeastern Saskatchewan Province, Canada. Location, at 1 Hillesen-Crown, in LSD 5, 30-15-5w2, is 55 miles from the Manitoba line.

Deckard Drilling Co., Shreveport, is moving a rig from Mississippi to the Willow Lake field, Catahoula Parish, Louisiana, where it will be used on a well to be drilled under contract for Roy L. Fisher and associates of Monroe, La. The new well will be the first activity in the Willow Lake field since

On location at a deep test Coastal Drilling Co., Bakersfield, is putting down for Richfield Oil Corp. in the South Cuyama field area in Santa Barbara County, California. Left to right: E. A. Thompson, drilling superintendent for Coastal; C. A. Davis, division engineer, and Dick Chamberlin, assistant superintendent, for Richfield.

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TUBING CLAMP

A safety device as well as a universal set of slips, capable of handling tubing, bailers, and small drill collars. Of 2⅜", 2⅞", 3½", 4", and 4½" O.D. Self-aligning inserts with VARCO buttons facilitates maximum gripping surface. Complete within itself. Chrome alloy heat-treated steel.

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STANDCO BRAKE LINING

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Ideal for home and field offices.

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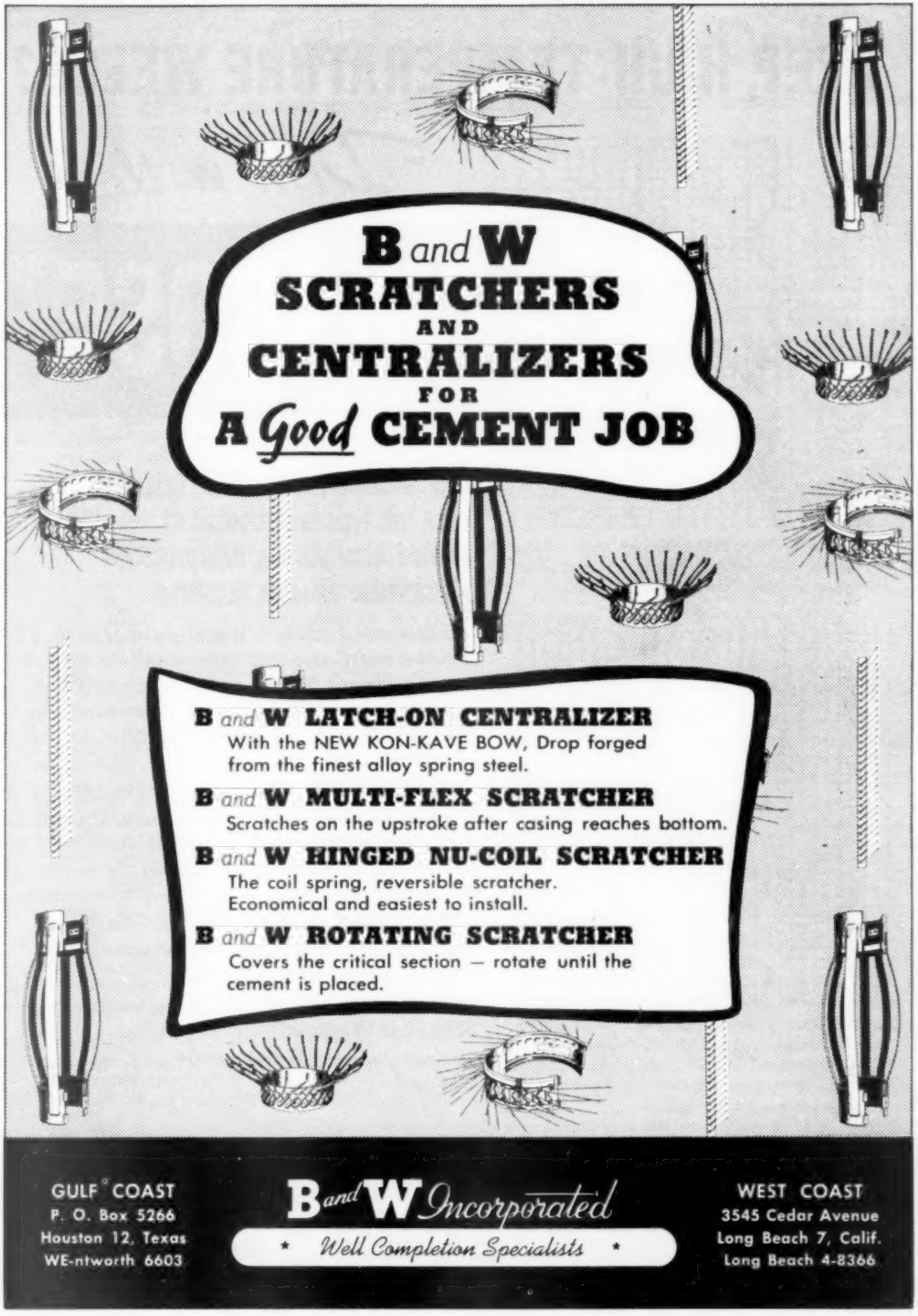
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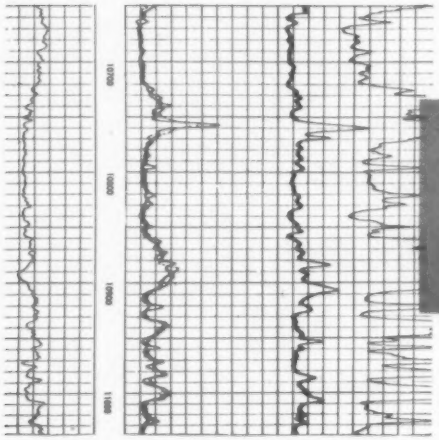
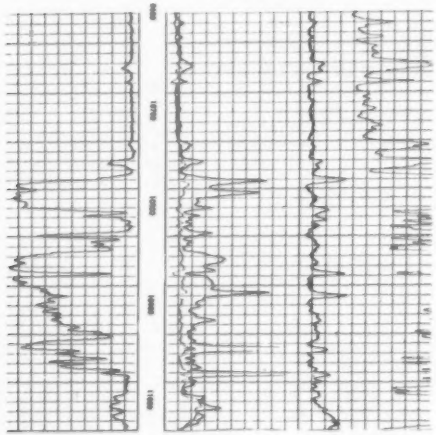


1. Section of Well No. 1, logged with a lime base, oil emulsion system. Log in this mud offers some interpretation and correlation problems.



2. Well No. 2, with paralleling stratigraphic structure, was drilled with a Driscose base oil emulsion system. Observe the improved spontaneous potential curve on the left. Furthermore, no mechanical or gelation problems.

Low alkalinity, low solids, Driscose base, oil type emulsion muds provide accurate log interpretation —minimize gelation problems

That's right! Look how this Driscose base mud gives an electric log that truly shows the formations penetrated. The properties of this mud were practically unchanged by aging at temperatures in excess of 325 F.—no high temperature gelation or solidification.

This high stability mud also resists breakdown from heavy mineral salt contamination. Driscose provides excellent water loss control. Acts as the emulsifying agent. Greatly improves the weight-suspending properties.

For practical, profitable advice on your particular mud problems—deep well or not—consult our experienced mud engineers.

Order Driscose from your regular mud dealer. Shipped in 50-pound, 6-ply, water resistant bags.

Portions of electric logs shown at left are further identified and discussed in the June, 1952 WORLD OIL article, "CMC Blended for Improved Resistivity."

*DRISCOSE is a trademark for Sodium Carboxymethylcellulose

DRILLING SPECIALTIES COMPANY

BARTLESVILLE, OKLAHOMA

Exploration and Drilling

Taming the Prodigal Wildcat

EXTRAVAGANT claims are being made for the use of "atomic instruments" in oil exploration. Are such claims justified?

A press release received not long ago says: "The recent introduction of atomic instruments in oil exploration has opened up a new geological era. It has cut millions of dollars from the cost of petroleum exploration and has been a boon to our defense effort. The introduction of atomic instruments into the oil industry has resulted in a tremendous drop in extravagant 'wildcatting'—the indiscriminate drilling for oil in territory not known to be productive." Toward the end of the release it is stated: "The combined operations of prospecting teams in the air and on land have tamed prodigal wildcatting into an efficient science."

That sounds as though atomic instruments offer the answer to the oil companies' prayers for a cheap way to find oil. It sounds as though the atom, which some atomic scientists predict will bring an end to the era of liquid fossil fuels by the year 2,000, may be the very thing that will postpone its everyday use as a source of power. It would appear that a dry wildcat is rapidly becoming a thing of the past; however, any tremendous drop in the number of wildcats completed dry has yet to show up in exploratory well statistics.

The recognition that radioactivity detection instruments might have a place in oil exploration is nothing new. Back in 1928 a Russian named Bogoiavlensky wrote a paper which detailed the results of experiments in what he called the radiometric exploration of certain oil deposits. These experiments showed that radiations increased above all of the oil-saturated lenses that were checked. Bogoiavlensky's theory was that the intensity of radiations originating in the earth depends mainly on the degree of concentration of radioactive elements in the depths of the earth; that organic oil and the source rocks underlying it possess an immense power of absorbing radioactive emanations and are richer in radium than the country rock. These experiments were made before the iron curtain went down and the findings were made available to the United States oil industry by the Bureau of Mines. An immediate revolution of the oil companies' methods for finding oil was not apparent.

More recently exploration for oil has been been carried out by the use of supersensitive indicators of radiation intensity. Detailed surveys, some airborne, indicate that as a rule an oil field is characterized by a radioactive low surrounded by a ring of high radioactivity, which marks the approximate margin of the field.

One of the current theories of "why the halo?" differs radically from the Russian's idea. It is that the radium has been dissolved from shallow shales by water coming from depth and that it is precipitated close to the surface in the form of radium sulfate; that the amount of radium sulfate precipitated should be proportionate to the amount of water moving up from below. Explanation for the radioactive lows over the field and the highs at the edges is that the water moving up from below is forced to go around oil pools, resulting in a lack of water movement directly above the pool and a concentration immediately beyond the edges.

The merits of any system of oil exploration must be judged by how much oil that system finds per dollar spent—theory alone, no matter how plausible, or "proofs" of the theory that have been demonstrated where oil has already been found do not offer a yardstick. Operators of radioactivity surveys have claimed several oil pools have been found by wildcats which were located on the basis of radioactivity surveys—those and the failures as well offer the information that the industry needs to judge the true value of this lauded tool.

The future may show that there is a definite place for radioactivity surveying in oil exploration, but it is certainly too early to make extravagant claims as to its effectiveness in taming the prodigal wildcat.

Philip C. Ingalls.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

MONTANA.—George J. Greer is running casing for completion at 2 Kendrick, NE NW NW 6-1s-35e, in the Nine Mile area of Big Horn County, after testing apparently commercial quantities of black 20°-gravity oil from the Tensleep between 4,556-88 ft. This is the first discovery of oil production in this general area of Central Montana.

SASKATCHEWAN.—Tide Water Associated Oil Co. as operator for itself and Atlantic Refining Co., Ohio Oil Co., and Columbian Carbon Co., announced the completion of a discovery well in the Saskatchewan portion of the Williston basin at Eastend. The well was swabbed and flowed at the rate of about 800 bbl. per day from the Jurassic lime.

WEST TEXAS.—Cities Service Oil Co. 1 Leverett, Dawson County wildcat near Welch field in 3-4-D. L. Cunningham Survey, may be the most northern Spraberry producer. Drill-stem test from 7,690-7,726 ft. flowed oil in 2 hours, at 12½ bbl. hourly, and unloaded while coming out with drill pipe. Top of the Spraberry was 7,430 ft.

UTAH.—Carter Oil Co. 1 Joseph Smith, C SE SE 16-3s-5w (USM) in the Flat Mesa area, Duchesne County, along the southern flank of the central portion of the Unita basin, made oil, mud and water on test of the Tertiary. The 1 Elmer Moon, C SW SE 8-4s-3w (USM) also made oil, after casing was cemented in the basal Green River zone.

North-Central Texas

Grayson Wildcat Finaled In Lower Strawn Sand

WICHITA FALLS.—Cox Drilling Co. 1 Bailey Talley unit, Grayson County wildcat, has been completed as a lower Strawn sand discovery, or 1-mile northeast extension well to the nearest such production in Big Mineral Creek field.

Completion was made through perforations at 5,297-5,305 ft. after drilling to 5,995 ft. Initial potential was 110 bbl. of 41°-gravity oil, with gas-oil ratio of 350 cu. ft. Choke size was not reported.

Northwest of McMillan Oil Creek sand field, Humble Oil & Refining Co. 1 Mark Williams was drilling below 8,633 ft. in shale and lime. The wildcat was projected to 12,500 ft.

Wilson, 7 miles northeast of Ringgold, was ready for completion after pumping 108 bbl.

In Montague County King and Heyne 1 of 28°-gravity oil a day from pay perforations at 5,827-5,831 ft., in the Bend conglomerate.

In Nolan County, U. S. Smelting, Refining & Mining Co. 1 Hicks, wildcat 2 miles north of Hylton, recovered 3,515 ft. of gas and 85 ft. of gas-cut mud on a drill-stem test from 5,860-95 ft. It was drilling ahead on a 6,500-ft. contract.

Wilbarger County received a new discovery at O. B. Kiel Jr. 1 W. T. Waggoner estate, 8 miles south south of Electra in 36-6-H&TC. Top of pay was 1,798 ft., drilled to 1,805 ft. On potential test the well pumped 194 bbl. of 37°-gravity oil a day.

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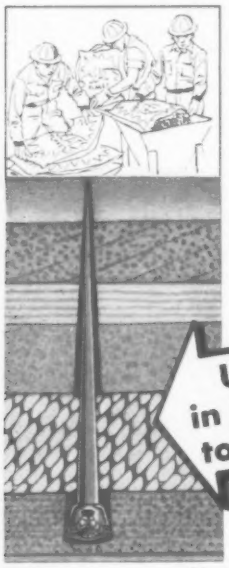

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NORTH CENTRAL TEXAS (DISTRICTS 7-B AND 9) SUCCESSFUL WILDCATS

Archer County: Miami Operating Co. 1 J. J. Maurer, 99-4-Clark & Plumb, TD 5,105 ft., perf. 4,486-92 ft., swabbed 21 bbl. oil in 6 hours.

Jack County: J. B. Hewitt 1 W. G. Chambers, L. Knight Sur., A-324, TD 4,560 ft., perf. 4,499-4,512 ft., IP 2,400 bbl. 43°-gravity oil, ½-in. choke, TP 700 psi., GOR 1,000 cu. ft.

Knox County: Mid-Continent Petroleum Corp. 1 George Buchanan, 44-2-D&WRR Sur., TD 5,809 ft., elev. 1,535 ft., pay 5,785 ft., IP pumped 146.6 bbl. 32°-gravity oil, GOR 122 cu. ft.

Shackelford County: Humble Oil & Refining Co. 1 Herman O. West, 57-14-T&P, TD TD 5,072 ft., elev. 1,827 ft., Gardner 3,881 ft., pay 3,893 ft., IP 71 bbl. 38°-gravtity oil, 24/64-in. choke, TP 100 psi., GOR 1,951 ft.

Throckmorton County: A. M. Howsley 1 J. B. Herrington, Sec. 903, TE&L Sur., TD 4,631 ft., elev. 1,284 ft., pay 4,432 ft., IP 311 bbl. 42°-gravity oil, 16/64-in. choke, TP 1,000 psi., GOR 750 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 7-B AND 9) WILDCAT FAILURES

Archer County: Archer Drilling & Production Co. 1 Farmer, Harris Subd., Club Ranch, dry, TD 1,340 ft.

Callahan County: McElroy Ranch Co. 2 Fae Wilbanks, J. H. Johnson Pre-Emption Sur., dry, TD 3,440 ft.

Clay County: C. Paul Laubenheim 1 Myrtle Henderson, TE&L Sur., 2,624, dry, TD 1,005 ft.

C. P. Laubenheim 1 Schattenfels, J. Scott Sur., A-691, dry, TD 1,067 ft.

Coleman County: A. D. Adkisson 2 Carl Williams, Blk. 279, Wm. Farris Sur., dry, TD 1,593 ft., elev. 1,463 ft., Fry 1,490 ft., Gardner 1,549 ft.

Belcher & Harding 1 O. L. Stevens, Blk. 2, Sec. 668, M. D. J. Trevino Sur., dry, TD 3,404 ft., elev. 1,691 ft., Caddo 2,547 ft., Ellenburger 3,288 ft.

Harry Greenspan 1 M. A. Ward, Walter Fosgate Sur. 487, dry, TD 2,131 ft.

Saxon Exploration Co. 1 Charles Rae, Sec. 276, S. D. Green Sur., dry, TD 2,400 ft.

Saxon Exploration 1 Sealy-Smith, 73-1-GH&H, dry, TD 2,472 ft.

United North & South Development Co. 1 R. E. Coplen, Sec. 8, J. H. Gibson Sur., dry, TD 3,550 ft.

West Central Drilling Co. 10-1 J. P. Morris, 10-2-GH&H, dry, TD 3,100 ft.

West Central 726-1 J. P. Morris, E. Tate Sur. 726, dry, TD 3,610 ft.

E. F. White Jr. 4 Edith Anson Boulware, 16-1-GH&H, dry, TD 1,815 ft.

Gary Wright 2 J. T. Blair, Sec. 20, GH&H, dry, TD 2,570 ft., elev. 1,822 ft., Morris sand 2,566 ft.

Comanche County: H. E. White 1 Edon W. Butler, W. L. Yarbrough Sur., dry, TD 2,924 ft., Mississippian 2,850 ft., Ellenburger 2,875 ft.

Denton County: D. H. Bolin 2 P. R. Cherry, J. B. P. January Sur., A-658, dry, TD 1,976 ft.

Eastland County: C. T. Hedges & Celtyn Hedges 1 G. S. Kendrick, 14-3-BBB&C, dry, TD 2,634 ft.

McBride and Hirst 1 W. L. Lewis, 13-3-H&TC, dry, TD 3,342 ft.

White Rock Oil Co. 1 S. E. Hittson, 88-4-H&TC, dry, T D3,632 ft., Lake sand 3,496 ft.

Haskell County: Humble Oil & Refining Co. 1 V. K. Gerick, Blk. 28, J. Wilson Sur., dry, TD 5,977 ft.

Jack County: Cox Drilling Co. 1 Richards, MEPRR Sur. A-424, dry, TD 5,650 ft.

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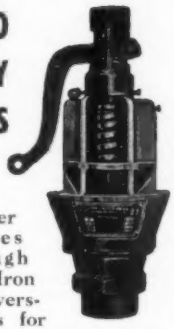

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S. D. Johnson 1 Gates Fry, E. Shield Sur., A-544, dry, TD 4,061 ft.

Jones County: Jones & Stasney 1-B Whaley, Blk. 28, Goodwin Subd., Austin & Williams Sur., dry, TD 3,337 ft.

Knox County: T. D. Humphrey 2 Mary Bush, E. Boren Sur. 53, A-28, dry, TD 6,145 ft., Caddo 5,549-5,620 ft., conglomerate 5,762-85 ft.

Montague County: Bay Petroleum Corp. 1 George Pollard, Ira Yate Sur., A-886, dry, TD 6,500 ft.

George Engle 2-C McCall, ETRR Sur., A-235, dry, TD 5,939 ft.

George Engle 1 Parr heirs, Blk. 16, Lge. 11, Calhoun CSL, dry, TD 7,035 ft.

Jackson-Douglas and Whitaker 1 Paul Donald, Blk. 41, Titus CSL, dry, TD 6,350 ft.

Nolan County: Wick Oils, Inc. 1 Caldwell, 162-1A-H&TC, dry, TD 7,007 ft., elev. 2,404 ft., Ellenburger 6,810 ft.

Stonewall County: Continental Oil Co. 1-A Springer, 199-F-H&TC, dry, TD 4,840 ft., Canyon reef 4,825 ft.

Shackelford County: E. W. Michot 2 O. D. Allen, Sec. 7, University Lands, dry, TD 243 ft.

W. K. Wood 1 Walker Est., Sec. 370, TE&L, dry, TD 700 ft., Hope 692 ft.

Stephens County: Joseph C. Ross 1 E. C. Moore, 7-6-T&P, dry, TD 3,309 ft.

Taylor County: L. N. Childress and H. S. Dew 2 Hinds, CEPI&M Sur., dry, TD 2,862 ft.

Wilbarger County: R. Clay Underwood 1 W. T. Waggoner Est., 27-4-H&TC, dry, TD 2,503 ft.

Young County: Lebus Bros. 3-A Allar Co., TE&L Sur., 3,410, A-1,230, dry, TD 3,522 ft.

Mississippi

New Discovery Seen At Wayne County Test

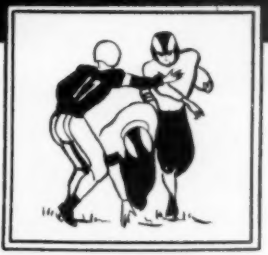
JACKSON.—Wayne County showed both promising and poor results in two new fields. A new discovery was hoped for at Daws-Stanley-Cushion, 1 Eddie G. Creagh, Section 19-10n-7w, approximately 2 miles north of production in the east segment of Yellow Creek field.

Casing was set to 4,890 ft. on the 5,214 ft. wildcat. Log indicated approximately 10 net feet of oil sand in the Morrison zone of the Eutaw at 4,735-58. Core recovery from this zone was poor, but good shows of oil has been noted. Casing was perforated with 100 shots at 4,736-46 ft. On 30-minute drill-stem test, using ¼-in. top and ⅜-in. bottom chokes, recovery was 1,470 ft. of 17°-gravity oil cut with 18 per cent b.s. and w.

A fault was encountered with approximately 130 ft. of displacement at top of Chalk on top of the Morrison sand. Test was approximately 145 ft. higher structurally than a dry hole located 1 mile west in Section 24-10n-8w. If wildcat is successful, it will be the first Eutaw discovery in the state in many years.

On the debit side in the county, Gulf Refining Co.'s 1 Chapman-Jones unit, Section 19-10n-6w, second test at Hiwannee field and northeast diagonal offset to the discovery well, has recovered only salt water from each of four sets of perforations in the Lower Cretaceous. Perforations were made at various intervals in the 9,014-40 ft. zone. Operators were preparing to swab after recovering only 270 ft. of muddy salt water

ALTEN presents OUTSTANDING PERFORMANCES



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on 52-minute drill-stem test of perforations at 9,014-20 ft.

MISSISSIPPI WILDCAT FAILURES

Franklin County: Gulf Refining Co. 1 N. W. McCraine, Sec. 45-5n-1e, dry, TD 6,800 ft.,

Jefferson County: Kemp Drilling Co., Inc. 2 W. M. Drake, Sec. 10-8n-1w, dry, TD 6,020 ft.

Southwest Texas

Weigang Extension Test Potentialed in Atascosa

CORPUS CHRISTI. — Hankamer Investment Co. of Houston has potenialed 1 W. T. Hurt, wildcat extension to Weigang field, Atascosa County. Well was potentialed for 66.77 bbl. of oil per day on pump. Top of pay is 3,771 ft. with production coming through open-hole 3,771-73 ft. and is pumping 23.5°-gravity oil with 65 per cent water and gas-oil-ratio which is nil. Drillsite is in Kindallis Bryan Survey A-69 and is southwest of Weigang field.

Ritchie and Mumme 1 M. J. Kivline et al, wildcat in Kleberg County, 9 miles southeast of Kingsville, has tested 87.5 bbl. of oil per day on pump. Oil had a gravity of 21° and was 50 per cent water. Production is from perforations at 2,114-19 ft. Operation is in Kleberg Town and Imp. Co. Lot 8, Section 39.

Phillips Petroleum Co. has potentialed the 1-A Clara Driscoll Est., wildcat, in Nueces County for absolute open flow of 3,000,000 cu. ft. of gas per day. Flow was effected through perforations at 4,833-40 ft. with 5½-in. casing set at 8,415 ft. Hole was bottomed at 9,000 ft. and top of pay was recovered at 4,833 ft. in the Het sand section. Location is in E. Villareal and W. S. McGregor Survey 582 and 583.

Richardson and Bass has potentialed 1-264 State Lease 31909, confirmation test to Blind Pass field, on open flow gage for approximately 23,500,000 cu. ft. of gas per day. Test was potentialed on 11/64-in. choke for 2,271,900 cu. ft. of gas per day plus 26 bbl. of distillate and well recorded a 3,915 psi. tubing pressure and 4,115 psi. shut-in pressure. Top of pay was at 8,017 ft. and perforations were shot at 8,017-25 ft. in the Marginulina-Frio section. Hole was bottomed to total depth of 12,565 ft. and 7-in. production string was set at 12,548 ft. Location is in Aransas Bay, about 8 miles southeast of Rockport.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Atascosa County: Lone Star Producing Co., 1-A Sarah E. Ferry, Thomas Orr Sur., Sec. 241, TD 2,263 ft., IP 141 BF, 11.5 BOPD, 17.9° gravity, 94 per cent water.

McMullen County: Phillips Petroleum Co. 1 Mula J. T. Pearson, trustee fee owner, 7 miles SE Fowlerton, Sec. 29, H. & O. B. RR Sur. A-583, TD 6,006 ft., prod. zone, lower Wilcox, top pay 5,264 ft., perf. 5,276-82 ft., IP 70 BOPD, 10 per cent water, ¼-in. choke, 525 psi., TP, GOR 3,475:1.

Nueces County: Phillips Petroleum Co. A-1 Clara Driscoll Est., E. Villareal & W. S. McGregor Surs. 582 and 583, TD 9,000 ft., prod. zone Hetereostegina, top pay 4,833 ft., perf. 4,933-40 ft., IPF open flow 3,000 M.c.f. gas on ⅜-in. choke, SIP 1,540 lb., ⅛-in. choke 539,000 CFGPD, TP 1,715 psi., SIP 1,815 psi.

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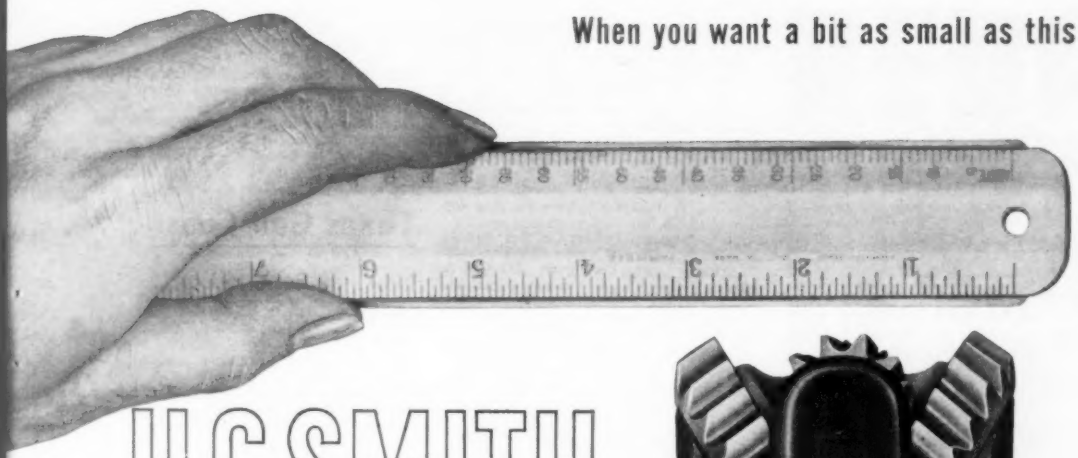

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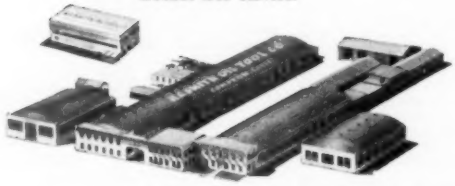

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San Patricio County: Jake L. Hamon, 1 Beulah Hodges "B," 4 miles NE of Mathis, Victoriano Jurrz Sur. A-11, TD 5,025 ft., prod. zone Vicksburg (basil), top pay 4,914 ft., perf. 4,917-25 ft., IPF 72.9° BOPD on ⅛-in. choke, TP 710 psi. CP 1,425 psi. Gr. 30.3°, GOR 804:1.

Arnold O. Morgan B-1 J. B. Hardwicke, 2 miles N of Odem, Pat Fitzsimmons Sur. Welder & Odem S/D Blk. 41, TD 8,513 ft., prod. zone Frio, top pay 6,876 ft., perf. 6,876-92 ft., IPF open flow 12,500 M.c.f. on 8/64-in. choke, 965,800 CFGPD 52.0° gravity, GOR 11,500:1, TP 2,508 psi., SIP 2,559 psi.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Atascosa County: R. D. Mebane 1 Joe A. Coughran, P. Salazar Sur. 937, dry, TD 1,650 ft.

Duval County: Leavitt Corning, Jr. 2 Duwell Co., G. H. & H. Sur. Sec. 95, A-259, dry, TD 4,443 ft.

Stice Drilling Co. et al and T. J. Ahern, 1 Leroy Denman, Realitos Subd. of Copita Fram and Garden tracts, Blk. 21, dry, TD 5,614 ft.

Hidalgo County: Taylor Oil and Gas Co., 4 A. A. McAllen, Sanita Anita grant, dry, TD 9,034 ft.

Jim Wells County: H. H. Howell, 1 B. W. Cox, J. B. Dibrell S/D Blk. 66, dry, TD 5,610 ft.

Curtis Singleton Drilling Co. 2-A Augusta Mueller, Dibrell Soyars Gallagher S/D Orange Grove, Lot 13, dry, TD 4,090 ft.

LaSalle County: L. A. Douglas, 1 Antonio M. Martin, J. M. Martin Sur., A-1,291, dry, TD 5,210 ft.

San Patricio County: Arkansas Fuel Oil Co., 1 Leola M. Cage, Geo. Sargent Sur. A-232, dry, TD 9,081 ft.

Webb County: O. W. Killam, 1-31 Floyd Billings, C.C.S.D. & R.G.N.G. Blk. 1, Sec. 31, dry, TD 3,010 ft.

Williamson County: Humphreys Oil and Gas Co. 1 Oma Lawlerm Jefferson West Sur., dry, TD 2,000 ft.

Wilson County: Leland L. Palmer and W. C. McBride, Inc., 1 Emory Montgomery, Morris May Sur. A-204, dry, TD 2,971 ft.

This announcement is neither an offer to sell nor a solicitation of an offer to buy any of these Shares. The offer is made only by the Prospectus.

3,180,188 Shares

Socony-Vacuum Oil Company, Incorporated

Capital Stock

($15 Par Value)

Rights, evidenced by subscription warrants, to subscribe for these shares have been issued by the Company to the holders of its Capital Stock, which rights will expire at 3:30 P.M. Eastern Standard Time on October 14, 1952, as more fully set forth in the Prospectus.

Subscription Price $31 a Share

The several underwriters may offer shares of Capital Stock at prices not less than the Subscription Price set forth above (less, in the case of sales to dealers, the concession allowed to dealers) and not more than either the last sale or current offering price on the New York Stock Exchange, whichever is greater, plus an amount equal to the applicable New York Stock Exchange commission.

Copies of the Prospectus may be obtained from only such of the undersigned as may legally offer these Shares in compliance with the securities laws of the respective States.

MORGAN STANLEY & CO.

DILLON, READ & CO. INC. — *THE FIRST BOSTON CORPORATION*

BLYTH & CO., INC. — *GLORE, FORGAN & CO.* — *GOLDMAN, SACHS & CO.*

HARRIMAN RIPLEY & CO. Incorporated — *KIDDER, PEABODY & CO.* — *LAZARD FRERES & CO.*

LEHMAN BROTHERS — *MERRILL LYNCH, PIERCE, FENNER & BEANE*

SMITH, BARNEY & CO. — *STONE & WEBSTER SECURITIES CORPORATION*

UNION SECURITIES CORPORATION — *WHITE, WELD & CO.*

DREXEL & CO. — *EASTMAN, DILLON & CO.* — *F. S. MOSELEY & CO.*

WERTHEIM & CO. — *DEAN WITTER & CO.*

September 26, 1952.

Texas Gulf Coast

New Pay Reported at Helen Gohlke Extension

HOUSTON. — Kirkwood, Seager, Weaver and Sharp have opened a new pay discovery in their 4 W. H. Kuester et al, southwest extension to Helen Gohlke field. Operators ran drill-stem test in Yegua zone 5,369-74 ft. with 500 ft. of water cushion and on ¼-in. choke well flowed 120 psi. surface pressure in 8 minutes with final surface pressure of 185 psi. Water cushion was to surface in 3 minutes and then driller pulled tool 7 stands and well started unloading 40°-45°-gravity oil. Recovery amounted to 3,250 ft. of oil with BHP of 1,350-1,840 psi. Well is bottomed at 8,200 ft. in the Wilcox, but will be plugged back to Yegua. Location is in P. F. Breeden Survey A-618, and is 1,000 ft. southwest of Kuester producing from perforations 8,178-8,210 ft. in the Wilcox with a potential of 134 bbl. oil daily on ¾-in. choke.

General Crude Oil Co. has established a new oil reservoir in the fourth Frio sand in the Esperson Dome area of Liberty County, at its A-70 Esperson-Moores Bluff. The 55-ft. fourth Frio sand was perforated with 16 shots at 4,408-10 ft. and completed for 94 bbl. of 27.3°-gravity oil per day on ⅛-in. choke under tubing pressure of 510 pounds. Gas-oil ratio registered 210:1 on 24-hour potential test with 0.1 per cent water in the flow. Hole is bottomed at 5,127 ft. with plug back depth of 4,789 ft. after cementing 7-in. production string at 4,470 ft. Discovery is located in G. C. & S. F. RR Co. Survey 24.

Sohio Petroleum Co. has established a new fault segment in the South Decker's Prairie area of Harris and Montgomery County with completion of 1 Martin Brautigam. On the basis of the structural position of 1 Brautigam and the subsea depth of the base of the completion perforations, being 14 ft. below the established Brautigam sand water level in South Decker's Prairie field, it is apparent the well is in a separate fault segment from the wells in the field.

Well is bottomed at 5,752 ft. and plugged back to 5,533 ft. after cementing 5½-in. production string at 5,561 ft. Brautigam sand of the Cockfield formation was perforated with 38 shots at 5,503-08 ft., with top of pay at 5,503 ft. On 24-hour potential, well flowed 84.93 bbl. of 38.5°-gravity oil and registered GOR of 705:1 under tubing pressure of 60-150 pounds on ¼-in. choke. Location is in J. H. Edwards Survey, A-20.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Bee County: Bright and Schiff, 1 R. L. and Neil Schoolfield, James G. Morrow Sur. A-229, TD 8,810 ft., perf. 7,840-44 ft., IPF: 2,900 M.c.f. gas plus 47 bbl. dist. per 1,000 M.c.f., SIP 2,714 ft. Tops: Slick sd. 7,827 ft., Luling sd., 8,010 ft.

Chambers County: Standard Oil Co. of Texas, 1 Alice Jackson White, James Jackson Sur. 14, A-395, TD 11,811 ft., prod. zone 10,300 ft. Frio, perf. 10,346-357

ft., IPF 25, 759 M.c.f. gas open flow, SITP 3,394 psi., 58° gravity, GOR 19,900:1.

Goliad County: F. William Carr, 1 J. W. Riggs, Jacob Fifer Sur. A-120, TD 8,760 ft., T/pay 4,904 ft., IPF 42.78 BOPD, 75 per cent water, 10/64-in. choke, 64.9° gravity, GOR 330:1, TP 350 psi.

Grimes County: J. M. West, 2 Olla Heath Garrett, A. B. Dodson Sur. A-174, TD 9,370 ft., prod. zone, Buda lime, prod. through OH 9,354-70 ft., IPF 30 BOPD on ½-in. choke, 10 per cent water, AP 145 psi., 10-hour test, SITP 2,200 psi.

Harris County: N. B. Hunt, 1 Leon H. Curtin, Geo. Ross Sur. A-646, TD 8,350 ft., PB 5,472 ft., prod. zone, Frio, perf. 5,452-62 ft., IPF 40,000 M.c.f. gas on absolute open flow, SITP 2,151 lb., 50.2° gravity GLR 336,700:1.

Liberty County: Floyd L. Karstenn C-1 Grogan Manufacturing Co., I. & G. N. RR Co. Sur., Sec. 15 A-884, TD 9,900 ft., prod. zone, Wilcox, perf. 8,826-33 ft., IPF 4,000 M.c.f. gas plus 40 bbl. dist. per M.M.c.f. 8/64-in. choke, TP 2,990 psi., SIP 3,200 psi.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Brazoria County: The Texas Co. B-2 T. L. Smith, Jr. "B," Darst Sur. A-61, dry, TD 4,110 ft.

Calhoun County: Arkansas Fuel Oil, 1 J. J. Welder et al, E. Hidalgo Sur. A-21, dry, TD 11,507 ft.

Dewitt County: Commercial Pet. & Transport Co. 1 Stephen Broll, James Kimberling Sur., dry, TD 4,827 ft.

Fort Bend County: L. M. Josey, Inc., 1 B. Settegast, Brooks & Burleson Sur. 9 A-444, dry, TD 8,082 ft.

Galveston County: John W. Mecon & Berkshire Oil Co., 1 Mrs. F. King et al, Wm. Scott Sur. A-177, dry, TD 7,344 ft.

John W. Mecon-Freeport Sulphur Co., 1 Mrs. Ika Bell Woolford, W. K. Wilson Sur., dry, TD 8,992 ft.

Goliad County: Paisano Trading Co., Ltd., 1 B. & C. Wilkinson, Joseph Callahan Sur. A-81, dry, TD 4,958 ft.

Harris County: C. C. Gilger et al, 1 J. B. Belin Sr., A. Lawson Sur., dry, TD 6,052 ft.

Karnes County: H. H. Howell, 1 Leon Pawlik, Luis Menchaoa Sur. A-5, dry, TD 6,819 ft.

Liberty County: Blairsville Machine Production Co., 1 G. S. Jeanes, Jno. Gibson Sur. A-850, dry, TD 9,512 ft.

General Crude Oil Co. 1 Mrs. Elizabeth Morris et al, Peter Mason Sur. A-69, dry, TD 10,887 ft.

Curtis Hankamer, 1 Walter Davis Jr. et al, S. Nicholson Lge. A-90, dry, TD 8,225 ft.

The Texas Co. & Feldman Oil and Gas Co. 1 J. T. Tortoris O/A, Leroy Guedry A-38, dry, TD 9,401 ft.

Matagorda County: A. W. George et al, 1 J. H. Craig Est., Thos. Williams Lge. A-107, dry, TD 1,005 ft.

Trull & Thompson, 1 Palacios Municipal Airport, J. Smith Sur. A-379, dry, Sec. 17, TD 3,507 ft.

Montgomery County: C. W. Hanslip, 1 Crawford, Jos. Lindley Sur. A-25, dry, TD 5,396 ft.

San Jacinto County: Sohio Petroleum Co. 1 Ogletree Lumber Co. et al, Uriah Gibson Sur. A-133, dry, TD 10,610 ft.

DERRICK ESCAPE MECHANICISM

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Canadian Fields

Important Strike Noted in Saskatchewan

CALGARY.—The Tide Water Group's Eastend 1 Crown Jurassic oil discovery well in the southwest sector of Saskatchewan flowed medium gravity crude oil during initial production tests. First indication of oil discovery at this wildcat, one of Saskatchewan's 16 oil strikes so far in 1952, came during drill-stem tests in the Jurassic below 4,740 ft. during mid-June. Following tests in that horizon, which did not flow oil, hole was deepened to total depth 7,458 ft. and also discovered natural gas in a formation below 6,300 ft.

The Eastend oil strike, located 62 miles east of the Alberta border, 32 miles north of the United States boundary and 54 miles south of the Socony-Western Prairie group's string of Jurassic sand and Cretaceous oil discoveries in the Fosterton-Cantuar-Success-Midway areas, has the appearances of a substantial producer, and adds a new producing zone for Saskatchewan. The 1 Eastend is the first well in Saskatchewan to yield oil in a sizable quantity from the Jurassic limestone formation.

The oil discovery well, Tide Water 1 Eastend-Crown, is on LSD 15, 11-6-20w3. After plugging back to the Jurassic, hole was perforated from 4,740-4,818 ft. A 4,650-gal. acid treatment was applied to the formation, and well was swabbed into production. Company officials stated the well flowed intermittently at a rate of 34 bbl. per hour, or 816 bbl. daily, during a short test period. Due to lack of storage tank facilities an extended production test has not as yet been run, but it is expected that a lengthy run will be carried out shortly, in an effort to give a better evaluation of the well's potential. It is believed that on a longer produc-

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Reda Pumps for source water wells provide many ways for lowering these production costs.

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Reda engineers have long been associated with water flooding operations and are fully qualified to assist operators in discussing their source water requirements.

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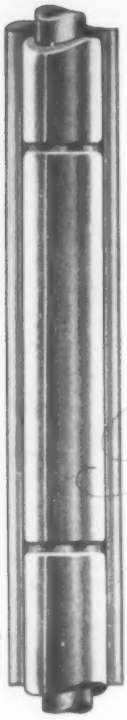

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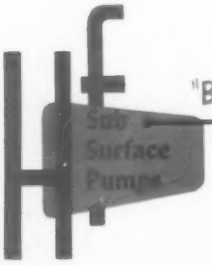

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tion test, that the discovery well's potential would be considerably lower than the 34-bbl. per hour rated established on the short test. Crew is currently awaiting pump installation.

CANADIAN SUCCESSFUL WILDCATS

Gulf 6 Allison, LSD 6, 29-38-22w4, TD 5,767 ft., on production; D2 Devonian oil well.

Pacific-Gas Exploration 1 Rycroft, LSD 8, 5-77-4w6, TD 6,084 ft., capped gas well.

Canadian Delhi-H. B. 1 Wardlow, LSD 6, 32-23-11w4, TD 3,250 ft., capped gas well.

CANADIAN WILDCAT FAILURES

Arthur-Mitmore 2-17 Isakson, LSD 2, 17-46-19w4, TD 4,200 ft.

Anglo-Socony 1 Pekisko, LSD 1, 1-17-3w5, TD 5,905 ft.

Hudson's Bay 1 Ranfurly, LSD 14, 20-49-12w4, TD 3,875 ft.

Legion 1 St. Paul, LSD 3, 16-60-9w4, TD 1,899 ft.

Bralsaman 2 Taber, LSD 4, 19-8-15w4, TD 3,292 ft.

Eastern Texas

Pettit Discovery in Prospect For Shelby

DALLAS.—A prospective Pettit limestone discovery was reported for Shelby County, approximately 2 miles southwest of Center. Trans-American Petroleum Co. 1 T. L. Hurst, Z. C. Walker Survey, recovered 180 ft. of oil, 90 ft. of heavily oil-cut mud, 60 ft. of mud and 300 ft. of salt water on a 15-minute test at 6,776-6,820 ft. Porosity was reported from 6,780-95 and 6,800-18 ft. Operators were to run electrical survey and attempt completion. Trans-American was said to hold some 2,000 acres around the test.

In Hunt County Floyd Ramsey 1 Paul was testing on the pump through perforations in the Woodbine at 3,210-16 ft., making oil and water. Earlier, the well had made around 50 bbl. of oil a day. It was drilled ahead to the Paluxy and plugged back.

Plans have been completed for a 4,200-ft. test in an old abandoned field of western Henderson County by E. B. Fletcher, as 1 J. C. McNair. Location is on a 113-acre tract in the D. O. Williams Survey of the Mabank field, which before being abandoned in 1942, produced from the Woodbine sand around 3,150 ft.

R. W. Fair will drill 1 Mrs. J. I. Knight as an 8,500-ft. Wood County wildcat 4½ miles east of Winnsboro. Location is on a 102-acre tract in the Samuel Brooks Survey, A-25.

General American Oil Co. 1 Gunter, wildcat 3 miles north of Quitman, was dry at 6,461 ft. after testing salt water from 6,185-6,214 ft. The well was said to have had some oil shows in the Paluxy.

EAST TEXAS (DISTRICTS 5 AND 6) SUCCESSFUL WILDCAT

Kaufman County: Tex-Jersey Oil Corp. 1 H. Brin, A. J. Payne Sur., Walter Fair field area, TD 4,959 ft., elev. 393 ft., IP 130.6 bbl. 28°-gravity oil, Paluxy pay 4,953-63 ft.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Cherokee County: Trans-Tex Drilling Co. 1 Mattie Melvin, H. S. Oliphant Sur., 4 miles S Jacksonville, dry, TD 5,625 ft.

Wise & Decker 1 W. E. Pierce, T. J. Rusk

Sur., 3 miles NE Tecula, dry, TD 4,470 ft., Woodbine 4,335 ft.

Kaufman County: J. M. DeuPree and F. R. Jackson 1 Mrs. Johnnie Willson, Juana Esculan Sur., 2 miles E Elmo, dry, TD 5,274 ft.

Limestone County: W. B. Hinton 1 Ruby Brodnax, Abram Frisby Sur., 2½ miles E Coolidge, dry, TD 2,548 ft.

Smith County: Cities Service Oil Co. 1 G. C. Wright, J. M. Garcia Sur., 1½ miles SW Crow, dry, TD 7,694 ft., elev. 312 ft., sub-Clarksville 5,115 ft., Woodbine 5,630 ft., Goodland 6,860 ft., Glen Rose 7,350 ft.

Oklahoma

Southern Payne Wildcat Makes Wilcox Discovery

DISCOVERY of a new Wilcox pool, located 4 miles south of Ripley and 2 miles south of the Ripley pool, in southern Payne County, near the Lincoln County line, is indicated by oil showings obtained by Atlantic Refining Co. at its 2 Jauch, SE SE NE 18-17n-4e.

Showings were in the first Wilcox sand, topped at 4,344 ft., and in which a drill-stem test at 4,363 ft. got gas in 7 minutes and recovered 360 ft. of 42°-gravity oil and 210 ft. of oil-cut mud. Second Wilcox sand, drilled to 4,393 ft., did not show, and oil string is run for completion in the upper zone.

Location is about a quarter mile north of 1 Jauch, drilled earlier this year by South Texas Development Co., which had promising oil showings in Red Fork sand. The latter well has been standing as temporarily abandoned following production tests which yielded some oil with water.

Davon Oil Corp. 1 Ringrose, a wildcat located 5 miles east of Guthrie, in Logan County, flowed at an estimated rate of 5,000,000 to 10,000,000 cu. ft. of gas per day and recovered 64 ft. of oil in a drill-stem test at 5,149-57 ft. in Bartlesville sand, topped at 5,148 ft. Gas was at the surface in 2½ minutes after the tester was opened. After 36 minutes it began showing a spray of oil. Tester was open 85 minutes. Deepened, the well logged the Mississippian at 5,232 ft. and the Hunton at 5,310 ft. As this is written, operators were preparing to run a drill-stem of the Misener-Hunton with bottom at 5,325 ft. Location is in the NE SW SE 4-16n-1w.

A new pay zone and a northward extension of the small Caddo field in Carter County are in prospect. The new discovery is being made by Beach & Talbot at their 1-A Noble, C SE NE 35-3s1e, which flowed gas and oil in a drill-stem test of the Chimney Hill (Hunton) zone at 4,547-85 ft. Gas was at the surface in 5 minutes and oil in 90 minutes of the 107-minute test. Oil flow was estimated at 15 bbl. per hour. The indicated well is at a 40-acre location north of only remaining producer in the pool, pay zone of which has been in the Sycamore (Mississippian). Casing is being run for completion.

Davidor & Davidor have a small gas discovery at their 1 Golliver, NW NE SW 3-21n-2w, 7 miles northwest of Perry, Noble County. The new well, with casing perforated at 4,730-40 ft. in lower Skinner sand, flowed initially at the rate of 1,900,000 cu. ft. of gas per day. Flow was reported to be increasing steadily. No fluid was indicated. Total depth is 5,234 ft.

Superior Oil Co. has passed up for the time being oil showings encountered in Hart sand at its 1 Slay, Garvin County wildcat, located 3 miles south of Lindsay in the C SW 27-4n-4w. A drill-stem in the sand at 8,546-8,622 ft. flowed gas in 15 minutes and recovered 90 ft. of 37.3°-gravity oil and 350 ft. of oily mud (50 per cent oil).

OKLAHOMA SUCCESSFUL WILDCAT

Garfield County: Carter Oil Co. et al 1 Hoover, SW SW SW 20-24n-4w, flowed 71 bbl. of oil from Misener 6,155-65 ft., 7 bbl. from Marshall 6,251-57 ft., TD 6,344 ft.

OKLAHOMA WILDCAT FAILURES

Bryan County: The California Co. 1 Nelson, SE NW SE 20-6s-8e, dry, TD 6,527 ft.

Garfield County: G. C. Parker 1 Shrock, NW NW NW 22-24n-3w, dry, TD 5,545 ft.

Mid-Continent Petroleum Corp. 1 Hendricks, SW NW SW 24-27n-8w, dry, TD 5,907 ft.

Jefferson County: Mack Oil Co. 1 Edward-Beavers, NE NE SW 31-3s-5w, dry, TD 3,784 ft.

Osage County: A. G. Oliphant 1 Osage, NE NW SE 36-22n-10e, dry, TD 1,941 ft. Jon Carson 1 Osage, NW NW SW 31-28n-7e, dry, TD 2,902 ft.

Pawnee County: S. C. Yingling Oil Operators 1 Griesel, SW SW NW 2-21n-5e, dry, TD 3,038 ft.

Payne County: Wilcox Oil Co. 2 Brown, NW NW SE 12-19n-1e, dry, TD 4,967 ft.

Wilcox Oil Co. 1 Thompson, NW SE NW 33-20n-2e, dry, TD 4,573 ft.

Stephens County: Mack Oil Co. 1 Russell, NE NE NE 2-1s-6w, dry, TD 6,525 ft.

Sinclair Oil & Gas Co. et al 1 Community Rovilla Pollard, SE SW NE 26-1n-5w, dry, TD 5,695 ft.

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California

New Heavy Oil Strike Recorded in Santa Maria

LOS ANGELES.—A new heavy-oil discovery was recorded in the Santa Maria area of Santa Barbara County and pipe has been set at two deep tests, one only a few miles from this new field and the other at a wildcat on the edge of Long Beach.

Union Oil Co. 4 Jesus Maria was completed as the discovery for Marshallia field in 3-8n-35w, about 6 miles west of Orcutt production and a similar distance northwest of Lompoc field. Completed in a fractured shale section at about 3,400-3,750 ft., the successful wildcat pumped 200 bbl. of 12°-gravity crude daily.

In 24-9n-34w, northwest of Orcutt production, Union set pipe in 18 Dome after drilling to 9,805 ft. The wildcat reportedly cored fractured Monterey shale containing relatively light crude oil. The 7-in. casing was landed at 9,805 ft. and was cemented through perforations at 9,373 ft.

Richfield Oil Corp.'s closely watched Long Beach test, directionally drilled from a site in the southeastern edge of Signal Hill, has encountered sufficient oil shows to warrant setting pipe. The wildcat, 1 Recreation Park-E, was drilled to 9,222 ft. and after an electric log was run 7-in. casing was set at 8,830 ft. The operator was attempting to secure a better water shutoff at last reports.

Signal Oil & Gas Co. and Intex Oil Co. were under way with their second test, 2 Signal-Intex-K.C.L. The new wildcat is in 2-10n-20w, about 3½ miles southeast of Eocene production and 2 miles east of the first test, abandoned at 5,527 ft. after running too low on structure. The new test will seek Miocene production, but if these formations are found to be running high the wildcat may seek the Eocene pays.

About 1 mile east of the Eocene development, in NW SE 27-11n-20w, Standard Oil Co. of California 39 K.C.L.-2 apparently failed to find the lower Miocene sand which Richfield found in its deep producers. Drilled to 6,137 ft., hole was plugged back to 4,429 ft. and 7-in. casing cemented at 4,215 ft. The pay zone is believed to be Button Bed sand, about 1,000 ft. below the field's regular upper and middle Miocene pays.

CALIFORNIA WILDCAT FAILURES

Fresno County, Little Panoche Creek area: Humble Oil & Refining Co. 1 John Etcheverry, 30-13s-12e, dry, TD 5,501 ft., elev. 455 ft.

Kern County, Bacon Hills area: P. & S. Oil Co. 38-X Theta, 29-28s-20e, dry, Button Bed 1,657 ft., Media 1,910 ft., Carneros 2,127 ft., TD 2,215 ft., elev. 1,151 ft.

Edison area: Rudi & Associates 1 Rudi, 36-29s-29e, dry, TD 800 ft., elev. 915 ft.

Fruitvale area: Westates Petroleum Co. 1 Olive Comm., 11-29s-27e, dry, TD 2,901 ft., elev. 438 ft.

Round Mountain area: H. S. Rothschild 1 Coffee, 2-28s-28e, dry, TD 2,154 ft., elev. 857 ft.

Los Angeles County, Ramona area: Rothschild Oil Co. 1 Ramona Comm., 8-4n-17w, dry, TD 4,078 ft., elev. 1,750 ft.

Sacramento County, Alta Mesa area: H. L. Alexander & G. J. Homan 1 C. W. Bottimore, 3-6n-7e, dry, TD 2,734 ft., elev. 125 ft.

Santa Barbara County, Cuyama Valley area: C. W. Colgrove 33-7 Russell, 7-10n-26w, dry, TD 8,124 ft., elev. 2,030 ft.

Cuyama Valley area: Richfield Oil Corp. 33-26 Perkins, 26-10n-26w, dry, TD 12,090 ft., elev. 2,316 ft.

Cuyama Valley area: Richfield Oil Corp. 45-24 Russell A, 24-10n-27w, dry, TD 7,264 ft., elev. 2,281 ft.

Sutter County, Colusa area: Honolulu Oil Corp. 1 Honolulu-Humble Butte Farms, 11-16n-1w, dry, TD 4,300 ft., elev. 65 ft.

Wild Goose area: H. H. Magee, Opr. 1 Dow Comm., 32-17n-2e, dry, TD 3,235 ft., elev. 79 ft.

Tulare County, Richgrove area: Continental Oil Co. 2 Konda, 26-24s-27e, dry, TD 2,250 ft., elev. 656 ft.

Ventura County, Cuyama Valley area: Richfield Oil Corp. B-1 Dixon, 25-8n-24w, dry, TD 3,150 ft., elev. 3,780 ft.

South Louisiana

New Pay Reported in Plaquemines Romere Field

NEW ORLEANS.—A new pay has been reported in Romere field, Plaquemines Parish, where The California Co. has completed 58 Romere Pass unit through perforations at 10,355-372 ft. On potential test, the well flowed 237 bbl. of 35.8°-gravity oil daily on 9/64-in. choke with tubing pressure of 1,800 pounds and GOR of 1,088:1. Well is bottomed at 11,023 ft. with 5-in. casing set at 10,591 ft. Test is located in Section 15-20s-19e. The field was discovered in 1950 and to date approximately 45 wells have been completed producing from 9,030 to 9,954 ft.

Phillips Petroleum Co. completed State Lease 1170 No. 1 as a south extension of

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Hog Bayou field in southern Cameron Parish. The well is drilled directionally with producing sand beneath the Gulf of Mexico on a 10/64-in. choke produced 1,500,000 cu. ft. of gas and 10.4 bbl. distillate per M.M.c.f. A second test on 16/64-in. choke produced 4,050,000 cu. ft. of gas and 10.6 bbl. of 50.8°-gravity distillate per M.M.c.f. Hole is bottomed at 8,577 ft. with perforations at 8,437-70 ft.

SOUTH LOUISIANA WILDCAT FAILURES

Allen Parish: Bateman Drilling Co. & Est. of Wm. G. Helis, 1 Charles I. Kuntz, 14-7s-5w, dry, TD 8,496.

Lafourche Parish: Sun Oil Co. 1 M. & E. Palmer, 79-15s-15e, dry, TD 14,578 ft.

Kansas

New Gas Producing Area Opened in Meade County

COLUMBIAN FUEL CO. has opened another gas producing area in Meade County, in the southwestern part of the state with the completion of its 1 Stevens, C NE NE 32-32-30. The well, producing from Marmaton lime, opposite which casing is perforated at 5,560-97 ft., established an open flow capacity of 8,750,000 cu. ft. per day. Hole is plugged back from the Mississippian, topped at 5,620 ft. and drilled to 6,000 ft.

Location, 15 miles southwest of Meade, is in the extreme western part of the county, 1½ miles from the Seward County line, 13 miles east of the Hugoton gas area, and 5 miles from nearest other production, 5 miles to the southeast in the Novinger area.

White Eagle Oil Co. has an indicated Heebener discovery at its 1 Koelsch, SE SW SW 24-24s-14w, 4 miles southwest of St. John, in southwestern Stafford County. Top of the Heebener was logged at 3,458 ft., and in a drill-stem test of the upper 14 ft., the well filled 600 ft. of clean oil with bottom-hole pressure of 1,350 psi. Deepening, the well encountered only slight showings in the Lansing, topped at 3,620 ft., and at latest report was drilling ahead to the Arbuckle. Location is 1½ miles east of the Richland pool.

Production of the Ainsworth South pool, in the north central part of Barton County, is being extended ¾ mile to the southeast, or a new area opened by Bay Petroleum Corp. at 1 Hitchman, SW SE NE 11-17-13. Testing Arbuckle lime, in open hole at 3,339-40 ft., the well swabbed an average of 4½ bbl. of oil per hour during an 8-hour period. The well also is a prospective producer in the Lansing-Kansas City lime, in which a previous drill-stem test at 3,218-36 ft. yielded 300 ft. of clean oil and 19 ft. of heavily oil-cut mud.

KANSAS SUCCESSFUL WILDCAT

Gove County: Wycoff-Williams 1 Lundgren, NE NE SW 31-14s-29w, 236 bbl. of oil from Mississippian 4,277-83 ft., TD 4,332 ft. (opens Lundgren South pool).

KANSAS WILDCAT FAILURES

Barton County: Petroleum, Inc. 2 Newkirk "A," SW SE NE 28-20s-14w, dry, TD 3,590 ft.

Graham County: Mid-Plains-Veeder 1 Napue, SE SE SW 11-7s-21w, dry, TD 3,693 ft. Jones Shelburne & Farmer 1 Noah F, NE NE NE 32-10s21w, dry, TD 3,890 ft.

Phillips County: The Texas Co. 1 Emery, NE NW NW 16-5s-20w, dry, TD 3,636 ft.

Rooks County: Anschutz 1 Steeples, NW NW SE 25-9s-20w, dry, TD 3,800 ft.

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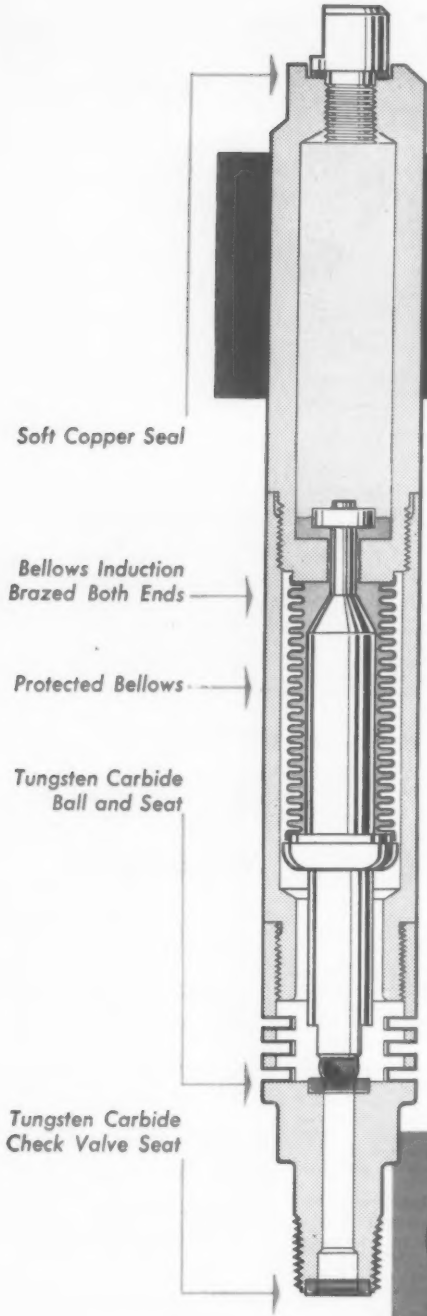
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2,188,668		2,305,250	2,358,944	2,411,315

Other patents pending.

Stafford County: Lewis Drilling Co. 1 Goodman, SE NW SW 25-25s-14w, dry, TD 4,390 ft.

Trego County: Barnett 1 Benson, SW NW NW 16-12s-22w, dry, TD 4,156 ft.

Wick 1 Strain, NE NW NE 27-12s-23w, dry, TD 4,510 ft.

EASTERN NEBRASKA WILDCAT FAILURES

Logan County: M. Miller 1 Baskin, C NE NE 1-18n-28w, dry, TD 3,935 ft.

Red Willow County: J. E. Polensky & Sons 1 Gehring, SE SE NE 25-4n-28w, dry, TD 3,510 ft.

Permian Basin

Flush Ellenburger Production Reported at Andrews Well

MIDLAND.—Anderson-Prichard Oil Corp. 1-24 Fasken has established flush Ellenburger production on the west-central flank of the shallow Midland Farms field of southeast Andrews County.

Top of the Ellenburger was 12,645 ft. on elevation of 3,057 ft., and total depth was 12,795 ft. An 8-hour flow through 24/64-in. choke produced 220 bbl. of oil, and on potential test through the same size choke from perforations between 12,672-702 ft. the well gaged 562.4 bbl. of 49°-gravity oil, for a calculated potential of 675 bbl. Plugged-back total depth was 12,702 ft. to shut off water found at the bottom.

In northeast Andrews County, Phillips Petroleum Co. was still working on its 1-CC University, trying to regain circulation lost in the Ellenburger at 13,855 ft. The well has indicated good production from the Devonian but at this time had not cored or tested in the Ellenburger.

Plymouth Oil Co. had a possible Strawn discovery at 1-A Foster in western Midland County in 11-41-T1s-T&P, southwest of Warfield and about 2½ miles northwest of nearest production in Parks-Pennsylvanian field. Drill-stem test from 10,551-640 ft., open 1 hour and 45 minutes, had gas in 15 minutes, and gas and distillate in 1½ hours. Estimated rate of flow was 20 bbl. an hour. Recovery was 240 ft. of oil and gas-cut mud, 1,080 ft. of clean oil and 15 ft. of salty water, which operators credited to the salty drilling mud being used to drill the well.

Gulf Oil Corp. 1 McElroy Ranch, Upton County discovery, developed oil for the fourth time on drill-stem tests of the Devonian. Last test was from 10,594-644 ft. recovered 1,270 ft. of clean oil, 440 ft. of mud-cut oil and 90 ft. of salt water.

Mar-Tex Realization Corp. and others 1 E. F. Bryan, Runnels County wildcat three miles north of Norton, developed flowing oil estimated at 20 bbl. hourly on a drill-stem test of the Goens limestone at 4,121-27 ft. Operators ran casing to top of the limestone at 4,121 ft. for completion tests. Elevation was 1,879 ft.

In Presidio County, Gulf Oil Corp. 1 Mitchell Bros. was attempting a drill-stem test to total depth of 14,204 ft. in sandy shale. Total depth was said to be in the Ellenburger, but not confirmed by operators.

Continental Oil Co. 1 Watson, Delaware basin wildcat in Ward County, was reaming hole at 14,878 ft. in black shale, preparing for a drill-stem test.

WEST TEXAS (DISTRICTS 7-C AND 8) SUCCESSFUL WILDCAT

Reagan County: Sinclair Oil & Gas Co. 1 Watson-Vaughn, 47-37-T5S-T&P, TD 7,685 ft., elev. 2,641 ft., Spraberry pay 7,597 ft., IP 132 bbl. 37°-gravity oil, TP 25 psi., GOR 1,015 cu. ft.

WEST TEXAS (DISTRICTS 7-C AND 8) WILDCAT FAILURES

Borden County: Union Oil Co. of California 1 Wm. D. Loggie, 9-32-T6N-EL&RR, dry, TD 8,809 ft., elev. 2,971 ft., Dean 7,770 ft., Canyon reef 8,784 ft.

Cochran County: Stanolind Oil & Gas Co. 1-C Reed, Sec. 19, Harrison & Brown Sur., dry, TD 12,664 ft., elev. estimated 3,770 ft., Pennsylvanian 9,215 ft., Mississippian 11,215 ft., Devonian 11,874 ft., Simpson 12,520 ft., Ellenburger 12,540 ft., pre-Cambrian 12,677 ft.

Crockett County: Barron Kidd 2-B Pure-Bean, 65-OP-GC&SF, dry, TD 1,503 ft.

Crosby County: Plymouth Oil Co. (formerly J. H. Jowell), 1 Williams, 58-3-WCRR, dry, TD 3,988 ft., elev. 2,504 ft., San Andres 1,950 ft., Clear Fork 3,226 ft.

Paul McHargue 1 Girard Trust, 42-3-WCRR, dry, TD 2,825 ft., elev. 2,552 ft., San Andres 2,000 ft.

Dawson County: Sinclair Oil & Gas Co. 1 Grady Scott, 101-M-EL&RR, dry, TD 13,036 ft., elev. estimated 3,017 ft., Strawn 10,654 ft., Mississippian 11,678 ft., Devonian 12,137 ft., Ellenburger 12,895 ft.

Ector County: Buffalo Oil Co. 1-BA H. S. Foster, 14-43-T3S-T&P, dry, TD 4,786 ft.

Glasscock County: Youngblood & Foree 1 H. V. Hodges, 42-32-T5S-T&P, dry, TD 6,276 ft., elev. 3,522 ft., San Andres 2,406 ft., Wichita Albany 6,200 ft.

Reagan County: M. J. Brannon & Yeatman Drilling Co. 1 University Lands, 19-11-University, dry, 2,615 ft.

Runnels County: Saxon Exploration Co. 1 Henry Kresta, David Whitkoff Sur. 102, dry, TD 3,963 ft., elev. 1,638 ft., Gardner 3,766 ft., Caddo 3,946 ft.

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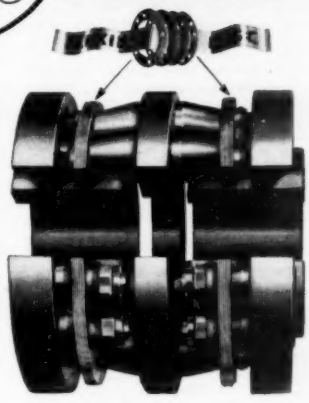

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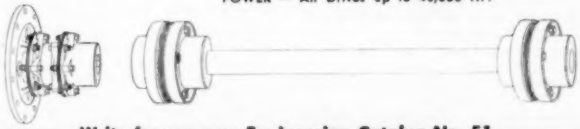


Write for our new Engineering Catalog No. 51

THOMAS FLEXIBLE COUPLING COMPANY
WARREN, PENNSYLVANIA, U.S.A.

Sec. 503, GH&H Sur., dry, TD 4,204 ft.
Schleicher County: Ralph Lowe 1 M. M. Reynolds, 57-1-GH&SA, dry, TD 6,042 ft., elev. 2,376 ft., Strawn 5,325 ft., Ellenburger 5,894 ft.
Tom Green County: Bert Fields 1 Campbell, F. Dirks Sur. 1,616, dry, TD 4,794 ft., elev. 1,729 ft., Wolfcamp 1,350 ft., Strawn 4,070 ft.
Union Oil Co. of California 1 E. H. Jones, German Emigration Co. Sur. 756, dry, TD 5,818 ft., elev. estimated 1,983 ft., Home Creek 5,291 ft., reef 5,610 ft.
Ward County: Argo Oil Corp. 1 Bessie Barron, 177-34-H&TC, dry, TD 5,090 ft., elev. 2,686 ft., Delaware line 4,975 ft., sand 5,003 ft.

TEXAS PANHANDLE

In Roberts County, Texas Panhandle, Morgan & Head 1 Morrison Ranch, 12-C-G&M, developed oil and gas in granite wash from 6,950-80 ft. The 3-hour test had gas at the surface in 9 minutes and recovered 2,570 ft. of 37°-gravity oil, plus 30 ft. of heavily oil and gas-cut mud. Location is 12½ miles northwest of the Quinduno field.

Sinclair Oil & Gas Co. 5-E Lips, indicated northeast extension to the Lips field of north Roberts County, showed 2,500,000 cu. ft. of gas on a 1-hour test at 8,581-8,610 ft.

In Hemphill County, 5 miles northwest of the town of Gem, Sinclair 1 Isaacs was drilling sand and shale at 11,240 ft. with no shows reported.

In the new Berneta area of Hartley County, Kerr-McGee Oil Industries, Inc. 3 Berneta was coring at 5,700 ft. Same operators' 4 Berneta was drilling at 3,600 ft.

TEXAS PANHANDLE (DISTRICT 10) WILDCAT FAILURES

Armstrong County: Standard Oil Co. of Texas 1-A Palm, 141-B4-H&GN, 12½ miles W Claude, elev. 3,509 ft., Wichita Albany 3,510 ft., Wolfcamp 4,075 ft., Cisco 5,435 ft., pre-Cambrian 6,112 ft.
Gray County: Phillips Petroleum Co. 1 Campbell, 25-3-I&GN, 6 miles NE Pampa, dry, TD 10,335 ft., elev. 3,115 ft., Simpson dolomite 9,490 ft., Simpson sand 9,590 ft., Ellenburger 9,840-50 ft., (?).
Wheeler County, stratigraphic test: Gulf Oil Corp. 1 Moore, 8-A3-H&GN, 7 miles NE Wheeler, TD 4,250 ft., dry.
Gulf 1 Tinsley, 22-A5-H&GN, dry, TD 4,250 ft.

SOUTHEAST NEW MEXICO

Superior Oil Co. 1-4 State in 4-16s-35e, completed for 294 bbl. of oil a day to extend Townsend Wolfcamp field ½-mile north. Production was through 18/64-in. choke from pay at 10,332-53 ft.

Another extender was Amerada Petroleum Corp. 1 Allie Lee, northwest of Moore Devonian field. Potential was 269 bbl. of oil a day.

Continental Oil Co. 1 Anderson Ranch unit, western Lea County wildcat which burned last week, was attempting a drill-stem test of the lower Pennsylvanian from 12,141-70 ft. at the time it blew out and later caught fire.

SOUTHEAST NEW MEXICO WILDCAT FAILURES

Lea County: Lone Star Producing Co. 1 Warren Davis, 19-9s-37e, dry, TD 12,381 ft., elev. 4,025 ft., Mississippian 11,930 ft., Devonian 12,348 ft.
McAlester Fuel Co. 1 State B. J., 2-14s-37e, dry, TD 10,715 ft., elev. 3,854 ft., Wolfcamp 9,580 ft., Pennsylvanian 10,700 ft.
Stanolind Oil & Gas Co. 1-X State, 11-17s-36e, dry, TD 11,500 ft., elev. 3,835 ft., Drinkard 7,585 ft., Abo 8,110 ft., Wolfcamp 9,920 ft.

Rocky Mountain

Morrill County Due First Oil Production

DENVER.—The northern portion of the Denver-Julesburg basin, and Big Horn County in south central Montana have produced apparent oil discoveries during the current week.

G. H. Chizum, Fort Worth independent, has set casing and is preparing for production tests on the most northerly discovery to date in the Denver-Julesburg basin, and the first producer in Morrill County, Nebraska. The wildcat is 1 Hart, SW SW SW 6-18n-49w, about 8 miles north of production in Dalton pool, Cheyenne County, and about the same distance south of the town of Bridgeport. Chizum reported a recovery of 600 ft. of clean oil from the "J" sand interval 4,007-22 ft. Core from 4,011-22 ft. recovered 11 ft. of well-saturated sand. Flowing pressure during the 65-minute test was 225 psi., and shut-in pressure after 20 minutes was 940 psi. Recovery in addition to the oil included 175 ft. of heavily oil-cut mud and 5 ft. of muddy water. Lower test 4,022-36 ft. made 400 ft. of oil, and 40 ft. of gas-cut muddy water. Test from 4,036-47 ft. recovered mainly salt water.

In the Nine Mile area of Big Horn County, Montana, George J. Greer, of Dallas, has tested 20°-gravity black oil from the Tensleep in 2 Kendrick, NE NW NW 6-1s-35e, 10 miles east of the town of Hardin. Tensleep was topped at 4,588 ft. and on test of the zone 4,556-88 ft. the well made 1,440 ft. of oil through ½-in. choke in 2 hours. Flowing pressure was 50-675 psi., and shut-in pressure 1,800 psi. The operator is running casing. This is the first oil production in this portion of Montana. Some gas has been produced from Frontier in the Nine Mile area since 1913. Nearest oil production is at Soap Creek, 45 miles to the southwest, where production is from the Madison.

In North Dakota Pure Oil Co. has shows at the 1 McGinnity, C NW NE 6-158n-95w, 5½ miles northwest of production in the Tioga area, Williams County. The well made 200 ft. of 30 per cent oil-cut mud and 180 ft. of gas-cut mud on test of the zone 8,055-154 ft. Top of Madison was reported at 8,000 ft.

This wildcat is northwest of a well suspended in 1951 by Amerada Petroleum Corp. in Section 13-158n-95w, after Madison proved noncommercial, and is believed to indicate a possible new pool along the Nesson anticline. It is the first operation in the area by Pure.

WYOMING SUCCESSFUL WILDCAT

Johnson County: Jeff Hawks 1 Government, W½ W½ NW 9-41n-81w, pumped 40 bbl. of oil per day and 5 bbl. water from Sundance sand 648 ft., TD 2,185 ft. PBTD 1,000 ft. (Sundance discovery).

WYOMING WILDCAT FAILURES

Carbon County: E. D. Delaney 1 Unit, NW NW NE 14-23n-79w, dry, TD 1,954 ft.
Sheridan County: Milo Siegel 1 Lupton, NW NE NE 23-58n-85w, dry, TD 5,010 ft.
Niobrara County: Crusader-Tri-State & Sierra 1 Government, NW NW SE 17-36n-63w, suspended indefinitely, TD 4,360 ft.

COLORADO WILDCAT FAILURE

Morgan County: Ginther-Warren & Ginther and Skiles 1 Wolever, SE SE NW 12-6n-55w, dry, TD 5,340 ft.

WESTERN NEBRASKA SUCCESSFUL WILDCATS

Cheyenne County: Ohio Oil Co. 1 F. Beyer, SW SE SW 9-14n-50w, pumped 80 bbl. oil per day from first Dakota, "D" sand discovery, new field, TD 5,103 ft.
Kimball County: Rogers Oil Co. 1 Schrack, SE SE SE 34-14n-56w, pumped 80 bbl. of oil per day from "D" sand 6,394 ft., TD 6,618 ft. PBTD 6,500 ft.

WESTERN NEBRASKA WILDCAT FAILURES

Cheyenne County: F. Kirk Johnson-Dunn & Boreing et al 1 Huddin, NE SE NW 18-14n-52w, dry, TD 5,696 ft.
Hope Oil Co. 1 Englert, C NE NE 31-17n-48w, dry, TD 4,875 ft.
Gage County: J. K. Walker et al 1 Claude C. Bartlett, C NE¼ 21-3n-5e, dry, TD 2,802 ft.
Kimball County: Rogers Oil Co. and Ryan Oil Co. 1 Markley, NW SW SW 35-14n-56w, dry, TD 6,639 ft.

NORTHERN NEW MEXICO WILDCAT FAILURES

San Juan County: Phillips Petroleum Co. 7-40 Strat test, C SE SE 5-30n-17w, dry, TD 1,367 ft.
Phillips 740-2 Strat test, C NW NW 9-30n-17w, dry, TD 1,141 ft.

UTAH WILDCAT FAILURES

Carbon County: Carter Oil Co. 1 Canyon Government, SW NE 13-12s-14e, dry, TD 9,802 ft.
Wasatch County: The California Co. 1 Unit, SE NW SE 26-5s-10w (USM), dry, TD 5,600 ft.
Uintah County: Continental Oil Co. 1 Unit, SW SE SW 27-13s-21e (SLM), dry, TD 4,215 ft.

MONTANA WILDCAT FAILURE

Fergus County: B&I. Drilling Co. 1 Nelson, C NW NE 21-12n-23e, dry, TD 1,675 ft.

NORTH DAKOTA WILDCAT FAILURE

Williams County: Champlin Refining Co. 1 Tank, C NE SE 7-156n-96w, dry, TD 12,237 ft. Silurian 11,978 ft.

SOUTH DAKOTA WILDCAT FAILURE

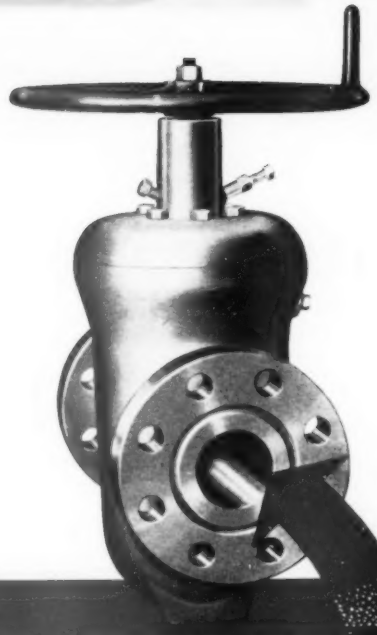
Walworth County: Max Pray 1 Kranzler, NW NW 14-121n-77w, dry, TD 3,808 ft. Granite 3,750 ft.

Louisiana-Ark.

Gas Tested in St. Peters Sand of White County

SHREVEPORT.—Deep Rock Oil Corp. is drilling ahead at 3,641 ft. after testing a small amount of gas from the St. Peters sand at 1 Sample, C N½ SW 4-10n-6w, White County, in central Arkansas. The St. Peters was topped at 3,510-12 ft. and the well logged a show of gas on mud log from 3,536-38 ft. A 2-hour drill-stem test from 3,512-38 ft. recovered odorless and noninflammable gas and 210 ft. of gas-cut mud, highly fluorescent with no evidence of oil. Operator then cored to 3,574 ft. and ran another test from 3,538-59 ft. recovering no show. A 4-hour and 5-minute test from 3,512-74 ft. brought gas to the surface in 3 hours and 35 minutes. Gas was inflammable and flowed at the rate of about 100 M.c.f. daily.

McAlester Fuel Co. will core ahead after making two successful drill-stem tests of the Meakin sand at 1-A Pendleton, C SE SW NE 24-18s-15w, Union County wildcat. The first test from 2,422-30 ft. recovered 240 ft.



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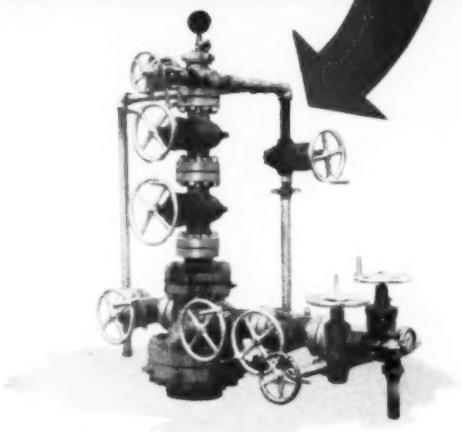
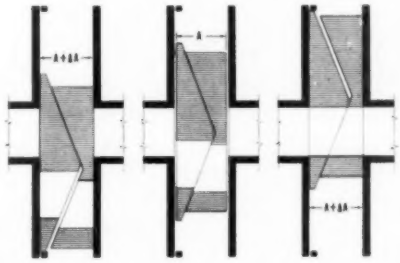


W-K-M Valves have a perfectly smooth bore which has about the same resistance to fluid flow as an equivalent section of smooth wall pipe. There are no cavities or projections to cause destructive turbulence or to collect sediment. The gate and the seats are fully protected against cutting or damage of any kind. These operating advantages are a result of the W-K-M Expanding Gate development which is illustrated below.



In closed position, the gate (left) and segment (right) seal tightly against both seats.

When opening or closing, the gate and segment are in neutral position, permitting free upward or downward movement of the gate assembly.

When open, the gate and segment again seal tightly against both seats and the bore of each lines up perfectly to provide a smooth, turbulence-free passage.

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These engineering and operational features are among the reasons why 80% of the world's high-pressure wells are controlled by W-K-M valves. Specify W-K-M when you want sure, positive control all over your Christmas Tree.

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Larkin Casing Head. All parts of forged steel. Oil and wear resistant Neoprene packing. Cast steel body. 2000 P.S.I. test pressure.

● The combination of a Larkin Casing Head and a Larkin Type SR Tubing Head provides a compact, flexible, yet economical means of surface control for medium pressure wells.

The Larkin Casing Head is specifically designed to allow free passage of Centralizers, Cementrol equipment, etc.

The Type SR Tubing Head is easily converted by a simple interchange of parts to any of several types of Larkin Tubing Heads, making it readily adaptable to any flowing, pumping or gas-lifting installation, including Kobe Free Pumping.

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of heavily gas-cut mud, 60 ft. of oil cut with water cushion, and 30 ft. of water cushion cut with mud, oil, and gas. A drill-stem test from 2,431-34 ft. recovered water cushion and 150 ft. of oil. Travis Peak production will be sought to depth of 3,500 ft.

LOUISIANA WILDCAT FAILURES

Bossier Parish: Atlantic Refining Co. 1 Crystal Oil & Refining Co., C SE SW 16-20n-13w, dry, TD 8,992 ft.

Claiborne Parish: Magnolia Petroleum Co. 1 Grigsby, C NW NW NE 36-23n-4w, dry, TD 3,559 ft.

Concordia Parish: Barnett Serio et al 2 Angelina Hardwood Lumber Co., C SE SW 21-4n-7e, dry, TD 7,507 ft.

ARKANSAS WILDCAT FAILURES

Calhoun County: B. E. Hill 1 Stringfellow, C NE SE 8-15s-13w, dry, TD 2,653 ft.

Prairie County: R. E. Smith 1 Sparks, C NE NE 21-5n-5w, dry, TD 1,370 ft.

Union County: Camco Oil Trust 1 Creer, 660 ft. N and W SEc 16-19s-15w, dry, TD 3,270 ft.

Central Area

ILLINOIS

D. B. Lesh Drilling Co.'s new discovery well, 1 Jones, SE NW NE 12-4s-9e, 7 miles north of Carmi, White County, swabbed 20 bbl. of oil per hour during the first 12 hours following a 2,500-gal. acid treatment of its O'Hara pay zone at 3,317-27 ft. Location is a mile southeast of the Centerville pool and about the same distance northwest of the Centerville East pool.

INDIANA

Lewis & Clemens Drilling Co. 1 Hancock SE NW NW 21-2n-8w, ¾ mile from other production in the Monroe City area, Knox County, swabbed 3 bbl. of oil per hour natural in initial production tests of Rosiclare lime saturation at 1,460-64 ft. Pay is being acidized for further testing.

WESTERN KENTUCKY

M. W. Howard 1 MacHensley, SE SE NW 19-Q-27, a wildcat in the northern tip of Daviess County, filled 400 ft. of oil in 1½ hours after perforating casing to test McClosky lime at 1,781-90 ft. Hole is plugged back from its original total depth of 1,820 ft. Location is 2 miles east of the Reed East pool, in northeastern Henderson County.

EASTERN KENTUCKY

In Greenup County and located in 24-X-80, Arnold's 1 Elmer Howard wildcat 3 miles east of Oldtown pool topped Corniferous lime at 1,517 ft. and drilled to a total depth of 1,531 ft. at which depth tubing is being run for production tests. Oil showings were also had in the shallower Berea sand at 803 ft. and 856 ft.

MICHIGAN

Taggart Bros. Gas Co. Co. 1 Degen-Phillips, NW SE NE 27-19n-18w, Hamlin Township, Mason County, located about 300 ft. south of a Dow Chemical Co. deep chemical brime test well which showed for about 15 million cubic feet of gas a day from the basal Salina-Niagaran on drill-stem test, was shut down for orders this week at 4,417 ft. Well had been cored through the section which showed the gas pay 300 ft. to the north, and it was reported that this offset had failed to log a commercial pay zone. The 1 Degen-Phillips was reported to be structurally lower than the Dow test. One core in the Niagaran at the Dow 32 Fee was reported to have showed a 45 degree dip, and it appeared that the Taggart test had been drilled on the down dip side of the deeper structure, or reef, whichever may be the case. This first follow-up in Hamlin Township will be capped at least temporarily and may be reworked and possibly acidized after other tests have been completed in the area. Other active drilling wells in this district was Brazos Oil & Gas Co. 1 Genson & Wheaton, NE SW NW 26-19n-18w, which is located just 1,980 ft. east of the Taggart well and was being drilled below 3,240 ft.

ILLINOIS SUCCESSFUL WILDCAT

Marion County: S. E. Mercer 1 Gibson, SW NE SE 32-2n-1e, IP 6 bbl., Pennsylvanian 688-98 ft., TD 705 ft. (discovery well Junction City South pool).

ILLINOIS WILDCAT FAILURES

Christian County: Collins Brothers 1 Fuch, NW NW SE 10-11n-1e, dry, TD 2,889 ft.

Clark County: Frank Zakowski 1 Emrich, NE SW SE 21-10n-14w, dry, TD 800 ft.

Edgar County: C. M. Faulkner 1 Fell, NW SE SE 1-13n-14w, dry, TD 457 ft.

Franklin County: C. Hair 1 Piper, SE SW SE 33-5s-1e, dry, TD 2,880 ft.

Lawrence County: Big Four Oil & Gas Co. 1 Jones, NW NE NW 23-3n-13w, dry, TD 2,286 ft.

Perry County: Sanders & Fye 1 Wisniewski, SW NW SE 12-4s-2w, dry, TD 1,585 ft.

Wayne County: Herndon Drilling Co. 1 Wolff, NW NW SW 11-3s-6e, dry, TD 3,474 ft.

A. J. Slagter, Jr. 1 Moats, SW SE NE 8-1s-9e, dry, TD 3,478 ft.

White County: T. G. Glass 1 Pumphrey, NE NE SE 4-6s-10e, dry, TD 2,126 ft.

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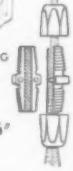

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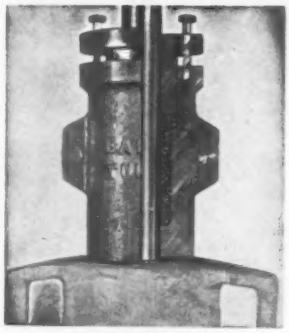

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George L. Wrather 1 Land heirs, NE NW SW 21-5s-10e, dry, TD 3,298 ft.

INDIANA SUCCESSFUL WILDCATS

Gibson County: Buchman & O'Neal 1 Barnett-Witherspoon, NE NW NW 19-3s-11w, IP 100 bbl., lower O'Hara 2,532-39 ft., TD 2,633 ft. (extension Owensville South pool).

Vigo County: B. L. Filingame 1 Bresett, NW NW NW 34-11n-8w, IP 108 bbl., Devonian 1,702-09 ft., TD 1,913 ft. (discovery well Riley South pool).

INDIANA WILDCAT FAILURES

Daviess County: Eidson & Gwaltney 1 Daugherty, NE SE NW 35-5n-7w, dry, TD 952 ft.

J. W. Harmon 1 Hasler, NW NE NE 9-5n-6w, dry, TD 731 ft.

J. W. Brewer 1 Taylor-Myers, SE SW NE 13-5n-5w, dry, TD 845 ft.

Lawrence County: Robert Dyer 1 Baker, N½ NE SE SW 14-5n-2w, dry, TD 1,225 ft.

Robert Dyer 1 Hackler, SW SE NE 14-5n-2w, dry, TD 1,165 ft.

Montgomery County: Frank Bridge 1 Anderson, W½ SW SW 2-19n-4w, dry, TD 825 ft.

Posey County: B. M. Heath 1 Wassmer, SE SW NE 12-5s-12w, dry, TD 2,361 ft.

Oil Management 1 Wilson, NW SE NW 6-6s-14w, dry, TD 3,091 ft.

Vermillion County: C. Wright 1 Foltz, NE SE NE 34-14n-10w, dry, TD 879 ft.

Warrick County: Stanley Drilling Co. 1 Staser, NE SE SE 23-7s-8w, dry, TD 1,860 ft.

Joe Bender 1 Nonweiler, NW NE NE 9-6s-7w, dry, TD 1,659 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

Henderson County: Hayes Drilling Co. et al 1 Shelby McDowell, NE NE NE SE 11-Q-23, IP 200 bbl., Cypress 2,065-85 ft., TD 2,085 ft. (extension Barker pool).

WESTERN KENTUCKY WILDCAT FAILURES

Henderson County: George S. Engle 1 Crofton, N½ NW SW NE 2-P-24, dry, TD 2,600 ft.

Lohman & Johnson 1 Thomas, W½ SE SE NE 16-O-23, dry, TD 1,841 ft.

McLean County: R. E. Stouder 1 Ellis, W½ NE NW NE 12-L-26, dry, TD 2,741 ft.

Ohio County: C. Faith et al 1 Westerfield, SE NE SW NE 24-H-34, dry, TD 575 ft.

MICHIGAN SUCCESSFUL WILDCAT

Ogemaw County, Ogemaw Township: Ogma Development Co. 1 Weiler, E½ SE SW 14-22n-1e, 40 bbl. from Richfield after acid, TD 4,239 ft. (A deeper horizon discovery on West Branch Dundee field structure.)

MICHIGAN WILDCAT FAILURES

Kalkaska County, Clearwater Township: W. H. Strickler 1 State-Clearwater, NE SW NE 28-27n-5w, Traverse 2,051 ft., dry, TD 2,106 ft.

Kent County, Byron Township: Universal Drilling Co. & Norocko Oil Co. 1 Marshall, SE NW NE 10-5n-12w, Traverse 1,781 ft., dry, TD 1,821 ft.

Muskegon County, Cedar Creek Township: S. Scott Wigle 1 Smith & Hamill, SW SW SW 15-11n-15w, Dundee 2,323 ft., dry, TD 2,377 ft.

Newaygo County, Croton Township: C. W. Collin 1 State-Croton, NW NW NW 18-12n-11w, Traverse 2,437 ft., dry, TD 2,453 ft.

Ottawa County, Polkton Township: Cook Drilling Co. 1 Braamse, SW NW NW 13-8n-14w, Traverse 1,882 ft., dry, TD 1,931 ft.

Appalachian-Ohio

Middle Fork Wildcat Finaled in Gordon Sand

PITTSBURGH.—In Middle Fork district, Randolph County, West Virginia, Blaho Oil & Gas Co., completed 1 B. L. & H. G. Shockey, wildcat, gaging 255,000 cu. ft. gas, Gordon sand 1,448-1,530 ft., gas 1,505-13 ft., TD 1,763 ft. Anthony Creek district, Greenbrier County, Natural Resources Corp. 1 T. M. Van Buren heirs, ran 7-in. casing at 1,350 ft., and is drilling at 1,354 ft. Jumping Branch district, Summers County, United Fuel Gas Co. 1-6788 J. Sanford Lilly, after completing a fishing job at 6,390 ft., is drilling again and is at a depth of 6,420 ft. Logan district, Logan County, Hope Natural Gas Co. 9715 Boone County Coal Corp., is at a depth of 4,300 ft.

WEST VIRGINIA SUCCESSFUL WILDCAT

Randolph County, Middle Fork District: Blaho Oil & Gas Co. 1 B. L. & H. G. Shockey, 255,000 cu. ft., gas Gordon sand, 1,448-1,530 ft., gas 1,509-13 ft., TD 1,763 ft.

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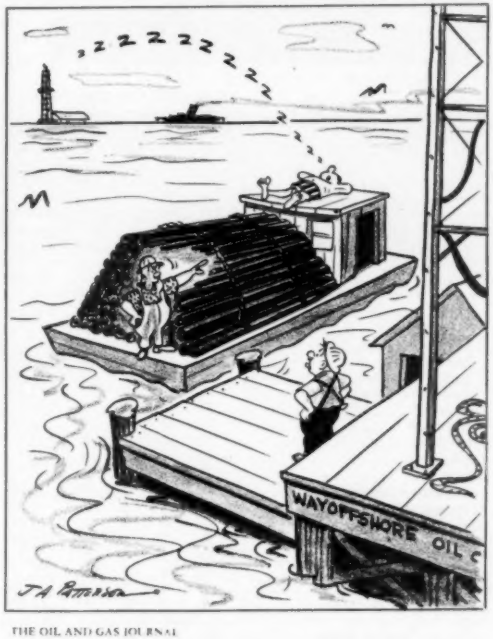
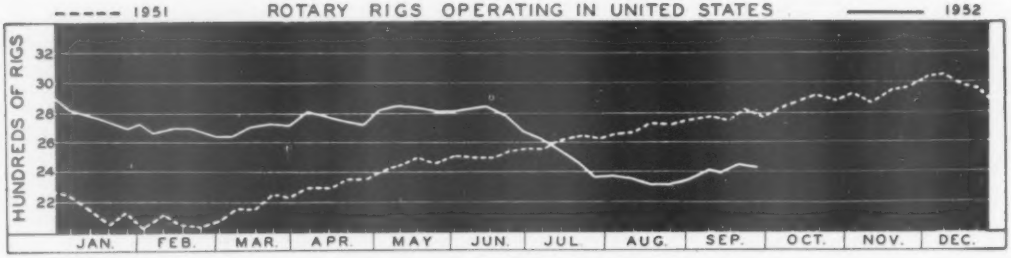
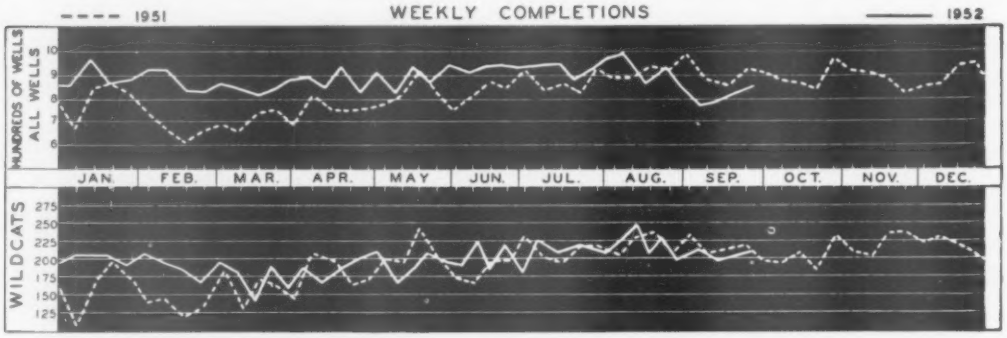


THE OIL AND GAS JOURNAL

"—and then the big lout says, "If anybody wants me, I'm up on the sun deck."!!"





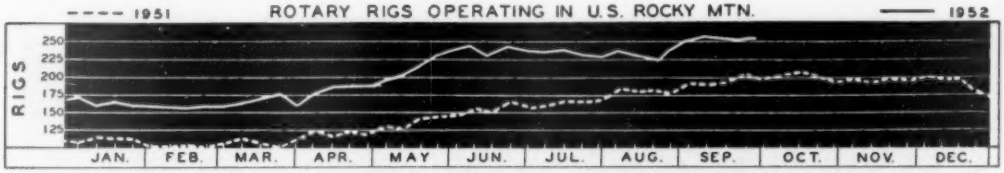
CURRENT STATISTICS

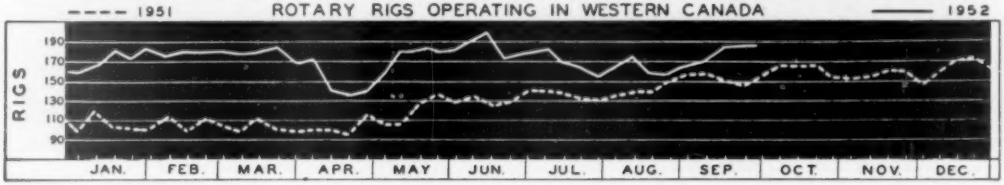
EXPLORATION

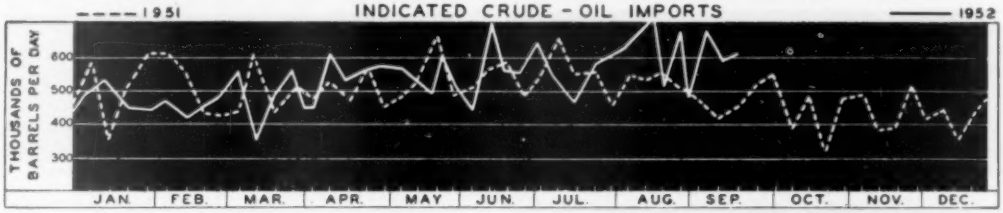
WEEKLY WELL COMPLETIONS . . . WEEK ENDED SEPTEMBER 27, 1952

	Total of all wells					Sept. 27		Wildcat completions and discoveries					Cumulative total, 1952				
	Comp.	Oil	Gas	Dry	Footage	1952	1951	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	17	8	0	*9	24,600	576	483	0	0	0	0	0	0	0	0	2	2
Pennsylvania	45	20	4	†21	90,200	1,468	1,289	0	0	0	0	0	0	0	0	2	2
West Virginia	12	1	8	3	32,029	464	445	0	0	1	0	1	0	0	4	5	9
Ohio	10	4	1	5	23,700	735	718	0	0	0	0	0	2	0	7	16	25
Indiana	36	10	0	‡26	60,228	926	1,003	2	0	0	11	13	28	0	2	263	293
Kentucky	28	8	5	15	50,820	959	945	1	0	0	4	5	19	0	1	191	211
Illinois	55	21	0	34	133,115	1,480	1,853	1	0	0	10	11	18	0	0	409	427
Michigan	15	7	0	8	41,839	533	576	1	0	0	5	6	22	0	4	178	204
Kansas	65	37	4	24	210,485	3,447	3,259	1	0	0	8	9	78	0	10	570	658
Nebraska	12	3	0	9	59,058	227	173	2	0	0	6	8	10	0	2	122	134
Oklahoma	86	42	4	§40	301,939	4,308	4,116	1	0	0	11	12	81	2	11	459	553
Texas	315	150	28	137	1,590,262	13,023	12,441	12	3	3	88	106	588	43	94	2,859	3,584
North Central (Dist. 7-B & 9)	103	51	0	52	370,044	4,095	3,772	5	0	0	36	41	326	2	24	1,187	1,539
West (Dist. 7-C & 8)	76	51	1	24	437,524	3,997	3,766	1	0	0	15	16	131	1	6	534	672
Panhandle (Dist. 10)	12	3	4	5	47,574	512	522	0	0	0	4	4	4	0	7	41	52
Eastern (Dist. 5 & 6)	11	3	2	6	60,277	689	924	1	0	0	5	6	16	4	2	171	193
Gulf Coast (Dist. 2 & 3)	65	16	16	33	471,698	1,949	1,711	2	3	1	17	23	60	26	24	412	522
Southwest (Dist. 1 & 4)	48	26	5	17	203,145	1,781	1,746	3	0	2	11	16	51	10	31	514	606
Louisiana	33	16	3	14	204,891	1,703	1,580	0	0	0	5	5	32	17	11	224	284
Northern	18	11	1	6	66,003	923	863	0	0	0	3	3	13	0	7	108	128
Southern	15	5	2	8	138,888	780	717	0	0	0	2	2	19	17	4	116	156
Arkansas	11	7	0	4	34,432	297	303	0	0	0	3	3	6	0	0	64	70
Mississippi	7	2	1	4	44,511	258	264	0	0	0	2	2	13	2	1	120	136
Southeastern States	2	2	0	0	11,964	49	44	0	0	0	0	0	3	0	1	26	30
Montana	5	4	0	1	9,066	228	163	0	0	0	1	1	5	1	1	54	60
Wyoming	13	6	0	7	67,682	509	551	1	0	0	2	3	10	0	3	93	115
Colorado-Utah	16	7	1	8	99,802	382	211	0	0	0	4	4	17	0	8	156	181
New Mexico	20	9	6	5	121,338	785	509	0	0	0	5	5	28	2	1	80	111
California	48	32	1	15	192,949	1,815	1,719	0	0	0	14	14	59	0	5	369	433
North Dakota	5	4	0	1	46,379	71	3	0	0	0	1	1	4	0	0	18	22
Miscellaneous (S. D.)	1	0	0	1	3,808	54	81	0	0	0	1	1	0	0	20	21	41
Total United States	857	400	66	391	3,455,097	34,297	32,729	22	3	4	181	210	1,032	66	186	6,301	7,585
Total previous week	822	389	62	371	3,452,913			15	0	5	183	203	1,010	63	182	6,120	7,375
Total September 29, 1951	907	491	82	334	3,632,242			36	3	8	151	198	1,118	60	191	5,904	7,273

Service wells included: *9, †16, ‡1, §4.





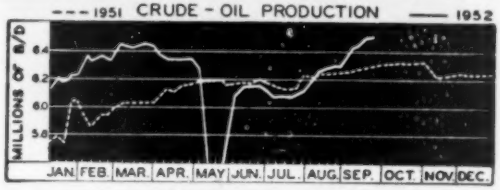


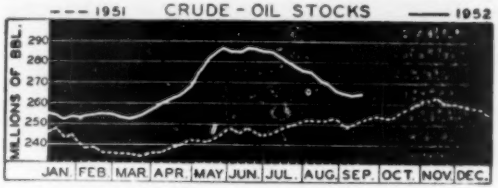
DAILY AVERAGE PRODUCTION FOR WEEK

	September 27, 1952			Sept. 20
	Crude oil	Lease condensate	Total	total
Alabama	2,900	.....	2,900	2,900
Arkansas	75,300	550	75,850	75,450
California	984,600	...	984,600	985,300
Colorado	88,900	...	88,900	87,200
Eastern	58,000	.....	58,000	58,000
Florida	1,600	.....	1,600	1,575
Illinois	168,000	.....	168,000	165,200
Indiana	34,000	.....	34,000	34,200
Kansas	349,200	.....	349,200	356,700
Kentucky	32,000	.....	32,000	32,100
Louisiana	641,525	27,600	669,125	670,175
North	110,000	2,100	112,100	113,150
South	531,525	25,500	557,025	557,025
Michigan	33,400	.....	33,400	33,100
Mississippi	92,150	3,550	95,700	95,750
Montana	26,000	.....	26,000	25,500
Nebraska	8,000	.....	8,000	8,100
New Mexico	164,450	400	164,850	164,650
Oklahoma	535,100	.....	535,100	534,200
Texas	2,932,450	41,500	2,973,950	2,973,950
Dist. 1	35,100	150	35,250	35,250
Dist. 2	169,475	3,750	173,225	173,225
Dist. 3	478,400	23,500	501,900	501,900
Dist. 4	267,750	4,900	272,650	272,650
Dist. 5	50,000	200	50,200	50,200
Dist. 6	124,000	3,500	127,500	127,500
East Texas field	271,500	.....	271,500	271,500
Dist. 7-B	104,750	50	104,800	104,800
Dist. 7-C	168,650	4,950	173,600	173,600
Dist. 8	997,475	200	997,675	997,675
Dist. 9	182,800	300	183,100	183,100
Dist. 10	82,550	.....	82,550	82,550
Utah	4,800	.....	4,800	5,000
Wyoming	196,000	.....	196,000	190,000
North Dakota	6,500	.....	6,500	7,800
Total U. S.	6,434,875	73,600	6,508,475	6,506,850
Change from previous week, up			1,625	
Canada	212,900	.....	212,900	180,000

Total U. S. production January 1-September 27 1,664,065,400 bbl.
Same period last year (crude plus cond.) *1,654,975,800 bbl.

*Includes 22,014,400 bbl. condensate.



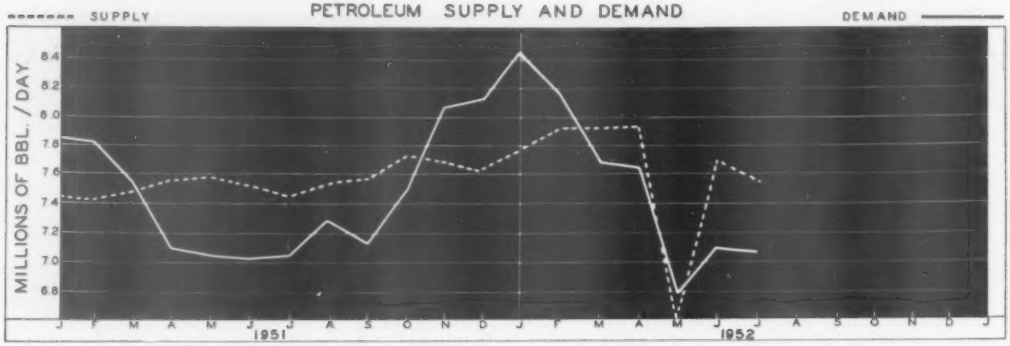


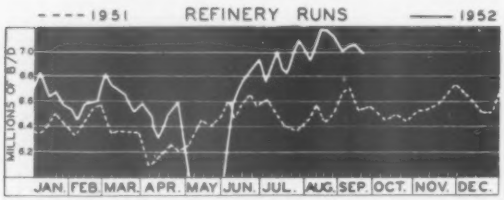
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

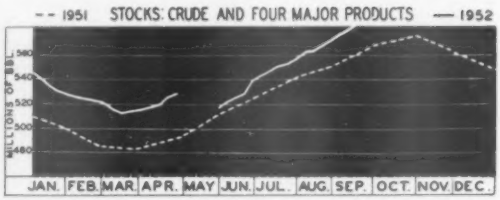
(Thousands of barrels)

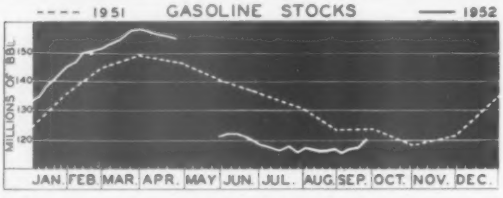
	Sept. 20, '52	Sept. 13, '52	Sept. 22, '51
Pennsylvania Grade	2,313	2,358	2,102
Other Appalachian	2,046	2,198	1,668
Illinois, Indiana, Michigan	12,170	12,378	12,962
Arkansas	3,065	2,975	2,869
Louisiana	16,511	15,837	15,397
North	2,257	2,288	2,580
Gulf	14,254	13,549	12,817
Mississippi	3,497	3,533	3,160
New Mexico	7,202	7,171	6,826
Oklahoma and Kansas	38,787	38,224	38,409
Texas	126,656	126,542	118,917
East Texas proper	13,183	13,080	(†)
West Texas	57,207	57,179	(†)
Texas Gulf	25,943	26,138	(†)
Other Texas	30,323	30,145	(†)
Rocky Mountain	14,757	14,950	13,125
California	30,399	31,113	30,030
Foreign	7,063	7,071	7,104
Total	264,466	264,350	252,569

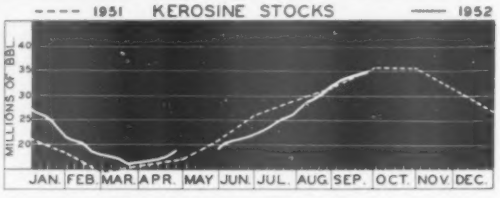
*Bureau of Mines. †Not comparable with current week.

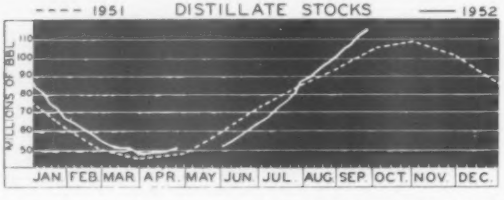


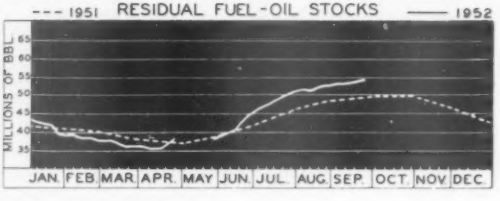










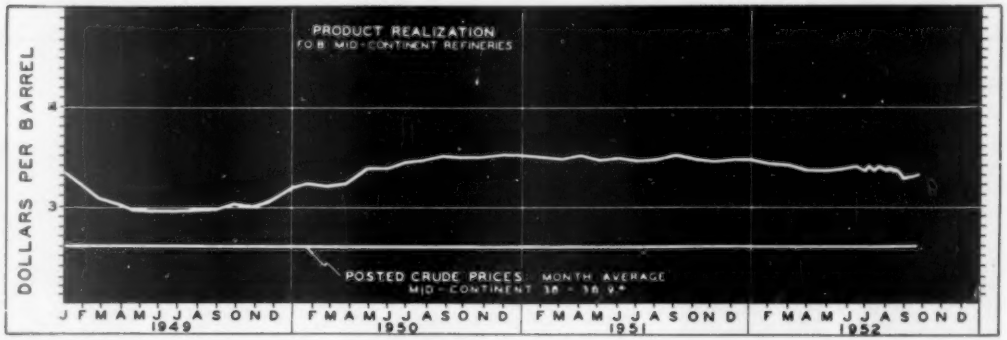


A.P.I. REFINERY REPORT, SEPTEMBER 27

(Thousands of barrels)

District—	Daily avg. runs	Daily average production— Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, September 1951— Daily avg. runs	Daily average production— Gaso.*	Kero.	Dist.	Resid.
East Coast	1,099	448.9	46.0	252.8	239.4	30,666	15,254	42,096	12,849	1,057	422.7	46.5	260.7	220.4
Appalachian:														
District 1	116	50.6	6.6	16.6	13.1	3,589	656	1,592	787	106	48.1	5.1	14.7	9.3
District 2	86	48.0	5.3	14.6	15.4	1,826	296	588	470	68	35.4	3.1	9.9	13.4
Ind., Ill., Ky.	1,290	687.0	76.0	226.3	157.6	25,478	7,715	23,018	6,860	1,174	619.0	74.0	191.6	152.3
Okla., Kans., Mo.	559	327.2	11.4	139.4	63.7	11,399	2,096	13,422	1,604	518	296.1	17.4	123.8	59.0
Inland Texas	247	171.9	13.3	43.3	35.3	3,967	474	2,442	1,174	253	176.5	13.3	39.4	42.2
Texas Gulf Coast	1,738	786.4	135.3	412.0	269.3	16,969	3,996	12,170	8,305	1,580	726.7	121.3	322.3	248.9
La. Gulf Coast	498	253.7	54.6	141.6	51.9	6,217	2,932	4,666	2,063	513	247.9	59.7	121.9	59.2
N. La. and Ark.	81	35.3	6.4	17.7	6.4	2,605	702	1,001	242	75	30.9	6.9	15.5	7.0
Rocky Mountain:														
New Mexico	18	10.4		2.8	3.9	80		65	63	14	8.7	0.3	1.5	3.8
Other Rocky Mtn.	248	114.1	7.0	46.3	42.1	3,019	478	2,228	1,232	219	99.7	6.9	40.7	42.0
California	1,007	432.4	14.4	145.7	364.0	14,461	390	11,439	18,934	981	415.2	9.4	139.8	370.6
Sept. 27, 1952	6,987	3,365.9	376.3	1,459.1	1,262.1	120,276	34,989	114,727	54,583	6,558	3,126.9	363.9	1,281.8	1,228.1
Sept. 20, 1952	7,075	3,425.7	389.7	1,468.3	1,217.9	118,315	34,680	112,472	53,484					
Sept. 29, 1951	6,558	3,012.1	364.1	1,303.4	1,190.3	122,468	36,171	104,170	49,014					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
4
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.32 for week ended September 20, $3.29 for previous week, and $3.51 for September 1951. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of October 1, 1952. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅜-10½	12.125-12.75	10¾-11
Premium gasoline, 86-88 octane	11⅜-11½	13.25-14.0	11¾-12
42-44 w.w. kerosine	8⅜-9	10.4-10.65	9
No. 2 straw fuel oil	7⅜-8	9.4-9.65	8-8.25
No. 6 residual	$0.90-1.00	$2.10-2.25	$1.50-1.75

NATURAL GASOLINE

	Group 3	North Texas	N. La
Grade 26-70	6⅞	6¾	6⅝
Grade 18-55	8.25	7.75	8.0

LUBRICATING OILS
South Texas

300 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS
Mid-Continent

150-160 vis., D Bright stock, 0-10 pp.	26-27
200 vis., No. 3 neutral, 0-10 pp.	14-15

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX
Mid-Continent

132-134 A.M.P.	5.5

SEVERAL indicators point to a seasonal easing in gasoline demand. Calculated demand for refinery-produced gasoline for the week ended September 20 was less than 1 per cent greater than for the same week last year compared with a gain over the previous year of about 4.5 per cent for the 4-week period ended September 13. Gasoline stocks increased about a million barrels for the week ended September 20.

In the Mid-Continent area more gasoline is available for open-market trading than early in September. Cycle gasoline, which normally changes earlier than refinery gasoline on either firming or softening market trends, is now moving at slightly lower prices. Cycle gasoline was moving at about 1.125 cents a gallon under the Group 3 low of 10.375 early in September. General reports in the Mid-Continent indicate that cycle gasoline, selling in competition with gasoline from Mid-Continent refineries, now must move at about 1.375 cents under the same Group 3 low.

Very little open trading in kerosine and distillate fuels was reported for the last few days in September. Most of the movement from refineries was against contracts. In the New York Harbor area primary storage for distillates is crowded, and most reports indicate that secondary inventories are at least up to normal for the season. Some distress material continues to move at prices under the normal posting for the area.

Trends in charter rates for dirty tankers have caused brokers to forecast lower rates for this winter. American vessels on the Gulf Coast-East Coast run accepted rates equal to the old Maritime Commission base. Single voyage rates for Caribbean to points north of Hatteras were MC less 10 per cent to meet competition from foreign vessels. Charters covering consecutive voyages through next February were reported at MC plus 40 per cent.

CRUDE PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93	....	....	....
19-19.9	1.98	....	....	....
20-20.9	2.03	$2.25	....	$2.13
21-21.9	2.07	2.27	....	2.14
22-22.9	2.12	2.29	....	2.16
23-23.9	2.18	2.31	....	2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico.

Last general price change represented a 50-cent increase, effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.	
Kettleman Hills, California*	$2.80
Louisiana:	
Beauregard Parish	2.60
Cotton Valley (distillate)	2.85
Cotton Valley (crude)	2.70
Texas:	
East Texas	2.65
Pecos County (Yates)	2.35
Conroe	2.83
Van	2.48
Pennsylvania Grade:	
Bradford	4.25
Southwest Pennsylvania	3.82
West Virginia	3.76
Illinois Basin	2.77

*37°-37.9°.

EQUIPMENT MEN . . . in the News

Mud Products, Inc. Announces Staff Changes

BEN R. BOURLAND

RALPH NATION

Appointment of Ben R. Bourland as general sales manager and Ralph Nation as operations manager of Mud Products, Inc., and its subsidiary companies, The Bomud Co., operating in Kansas and the Oklahoma and Texas Panhandle, and Beaumont Cement Sales Co., which operates along the Louisiana Gulf Coast, has been announced by E. R. Albert, Jr., president and general manager.

Bourland has been with Mud Products since its inception, having joined the company in Duncan, Okla., where he was associated with Jones & Laughlin for a number of years. He continued headquarters in Duncan as Mud Products' Oklahoma division manager. He was subsequently made manager of operations for the company's field points until his recent appointment as sales manager for the three companies.

Before joining Mud Products, Nation managed Hudson-Houston Co.'s store in Seminole, Okla. He became Mud Products' Oklahoma division manager and, more recently, vice president and general manager of Beaumont Cement Sales Co. when it was purchased by Mud Products in September 1951. Nation will continue in the latter capacity and combine his new duties with those concerning Beaumont Cement Sales alone.

Other changes in the companies' organization are the transfer of W. W. Carson from sales representative of the Mud Products' Tulsa office to division manager of the Beaumont Cement Sales with headquarters in New Orleans. Carson was employed by Mud Products in 1951, having previously been connected with Southern Oil Service & Supply Co., Inc., and Kaffie Lumber Co. in Southwest Texas. He is replaced in the Tulsa office by Roy H. Langford, a veteran of 20 years in the oil industry, 17 of which have been concerned solely with oil-field supply.

Due to the expansion of Mud Products and its subsidiaries, Chet Benefiel has joined the companies as transportation superintendent with headquarters in the Tulsa offices. Before joining Mud Products, Benefiel was associated with American Body & Trailer Co. in Tulsa as sales manager.

Steinkamp Is Appointed to Executive Post by Beckman

W. H. STEINKAMP

William H. Steinkamp has been appointed vice president and general sales manager of Beckman Instruments, Inc., South Pasadena, Calif., as announced by Dr. A. O. Beckman. Steinkamp is well known in the industrial instruments and process control fields as a result of 22 years' association with the Brown Instruments Division of Minneapolis Honeywell Regulator Co. where he served last as general sales manager, located in Philadelphia.

Steinkamp will make his headquarters at the South Pasadena plant.

Rakestraw to Manage New Store for United Supply

RAKESTRAW

H. H. Rakestraw has been appointed by United Supply & Manufacturing Co. of Tulsa to manage the firm's newest oil supply store located in Ardmore, Okla., according to H. B. Gutelius, Jr., vice president of the company.

Rakestraw was formerly a sales representative in West Texas before going to his new post. Previously he was store manager of the United Supply store in Ringwood, Okla.

Other men who will be active in the Ardmore store are Donald DuFor and Don MacKey. Resident district manager for the area served by the new store will be A. R. Brown.

United Supply now operates 27 supply stores and offices in a five-state area, including Texas, Oklahoma, New Mexico, Louisiana, and Kansas.

Web Wilson Appoints Buckner to Sales Force

Web Wilson Oil Tools, Inc., has announced the appointment of E. E. (Gene) Buckner as sales agent for the Southwest Texas Gulf territory with headquarters at Corpus Christi, Tex.

Before joining Web Wilson, Buckner completed 17 years' service with Baash-Ross Tool Co., and prior to this service he had years of experience in drilling, and as a small owner-producer.

Cummins Engine Names Boll General Sales Manager

C. R. BOLL

Appointment of C. R. Boll, Jr., to the position of general sales manager, Cummins Engine Co., Inc., Columbus, Ind., has been announced by R. E. Huthsteiner, president of the company.

According to the announcement, Boll will be responsible for engine, parts and contract sales, the company regional organization, advertising, and sales development.

Until his promotion, Boll was manager of engine sales, a position he had held since December 1948. His career at Cummins started in 1941 as a sales engineer following his graduation from Purdue University.

Maloney-Crawford Opens Office at Glendive, Mont.

Opening of a new branch sales and service office, including a stock of parts, at Glendive, Mont., by Maloney-Crawford Tank & Manufacturing Co., of Tulsa, has been announced by S. P. Wallace, president.

Frank B. Matthews, formerly located with Maloney-Crawford at Edmonton, Alta., will be in charge of the new office, under the area supervision of G. M. Cheatham, vice president of Maloney-Crawford of Canada, Ltd., Edmonton.

K. W. LINEBERRY

H. A. RUYSSER, JR.

C. H. MYERS

R. W. NICHOLS

F. C. MYERS

Sixty Years of Service

Black, Sivalls & Bryson observe anniversary with near completion of plant facilities in three cities

Black, Sivalls & Bryson, Inc., recently completed its sixtieth year of continuous operation. Starting in Ohio as a small company building wood tanks for oil storage, B.S.&B. has grown as the oil industry grew, and is now a company of six manufacturing plants and 52 branches and sales offices, employing over 2,500 people. The company now manufactures a complete line of oil and gas-field processing equipment, including automatic controls and safety devices.

A 2 million - dollar expansion of plant facilities has been virtually completed by B.S.&B. The program includes major expansion of the Oklahoma City and Kansas City plants, and expansion and relocation of the Odessa facilities.

The Oklahoma City plant expansion, providing for 57,000 sq. ft. of added manufacturing area, includes a new 600 by 80-ft. heavy - pressure - vessel welding bay, served by a heavy plate oven and new stress-relieving oven. A new steel plate bending roll will roll up to 3-in. plate cold, thicker plate when heated.

About 78,000 sq. ft. of manufacturing and storage space has been added at the Kansas City plant, including a new machine-shop bay, enlarged heat-treating facilities, and new shop offices.

A new welding shop, wood shop, and combination office-warehouse were included in the recently completed Odessa expansion totaling 21,000 sq. ft. Sixty years ago Adam H. Black built his first wood tank back in Ohio. Soon Black saw the future of oil moving westward. Before long he and his new partner, Jim Sivalls, moved west, to Kansas and Oklahoma respectively, where they joined with W. G. Bryson of Bartlesville.

The company soon began manufacture of bolted steel tanks, and in 1918 purchased Perfection Metal Products Co. at Topeka, continuing the production of wood tanks in the Independence and Bartlesville plants. In 1926 the first mass-production plant was built in Kansas City. In 1928 B.S.&B. acquired American Tank Co., of Oklahoma City, and in 1930 the big Oklahoma City plant was constructed. That same year, B.S.&B. expanded into Canada, and Black, Sivalls & Bryson, Ltd., was organized as a wholly owned Canadian subsidiary.

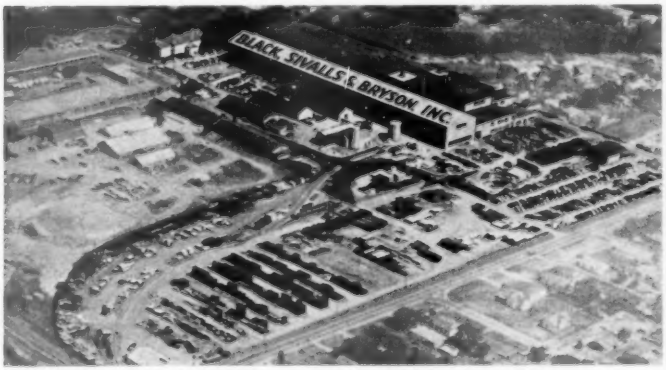
In 1949 B.S.&B. purchased the Controls Division of the Climax Engineering Co., Tulsa, and now manufactures a complete line of control equipment, valves, regulators, and drainers.

Several new offices were opened during the company's sixtieth year: Los Angeles, San Francisco, Bakersfield, Glendive, Farmington, Vernal, and Philadelphia.

B.S.&B. successfully introduced several new oil-field products during its sixtieth year: a new revolutionary horizontal emulsion treater; a glycol-injection low - temperature separation system; a single lease stabilizer; designs on small packaged gasoline plants, and a glycol - type gas - dehydration plant. B.S.&B. also expanded its line of controls, safety heads, and vent valves.

Kenneth W. Lineberry is president of B.S.&B.; Henry A. Ruysser, Jr., vice president and general manager of sales; Charles H. Myers, vice president in charge of the Oklahoma City plant; Ralph W. Nichols, manager of oil and gas equipment sales; Floyd C. Myers, manager of branch operations; Jimmy Dvoracek, sales manager for Climax Controls, and Lu N. Tidd, contract sales manager.

Regional sales managers are Ralph Stevens, Houston; Hal Fessler, Midland, Tex.; Lee Kelton, Casper, Wyo.; Ed Nelson, Ellinwood, Kans., and Ross Baze, Los Angeles.



Aerial view of Black, Sivalls & Bryson, Inc., expanded plant at Oklahoma City.

Atlas Pipe Moves Sales Offices to Larger Quarters

Atlas Pipe, Inc., and its associate company, Atlas Steel Products, has announced the removal of sales offices from the Esperson Building to the City National Bank Building in Houston.

According to W. H. Becker, presi-

(Continued on page 202)

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FOR SALE: 1500' of 4½" API. Full Hole Sonoscoped Drill Pipe. Wycoff - Williams Drilling Co. Grinnell, Kansas. Phone 57.

FOR SALE: Practically new Ruska Permeameters Cat. No. 1011. Hughes Engineering Company, 614 Westbrook Hotel, Fort Worth, Texas.

CARLOAD of Used Cast Iron Flat Belt Transmission Pulleys, sizes 12" through 72" diameter. Entire stock offered on close-out basis $75.00 per net ton FOB Monroe, Louisiana. M. KAPLAN & SON, Pipe—Structural Steel—Supplies. 9th & Adams Sts., Monroe, La.

FOR SALE: 5,000 Ft.—8⅝" OD Used Standard Black Pipe, P.E., No. 2 Grade, at $1.98 per ft. F.O.B. Monroe, La. 2,500 Ft.—8⅝" OD Used Standard Black Pipe, P. E., No. 3 Grade, at $1.50 per ft. F.O.B. Monroe, La. M. KAPLAN & SON. Pipe—Structural Steel—Plates—Supplies. 9th & Adams Sts., Monroe, La. Phone 5112.

FOR SALE: One #10 Unit Rig complete ready to drill powered with 2-D 13.000 Cat Engines compounded. 96' Lee C. Moore Cantilever Derrick skid type. 7¼ Gardner Denver Pump. 4500 feet drill pipe. 2 dog houses. A. D. ALLISON & CO., INC., 715 Brown Building, Wichita 2, Kansas.

900 MILES LINE PIPE

Selected, No. 1 grade. Thoroughly reconditioned for re-use.

400 Miles 8⅝ in. O.D., 29 lb., .322 wall
200 Miles 8⅝ in. O.D., 24 lb., .285 wall
200 Miles 6⅝ in., O.D., 19 lb., .280 wall
100 Miles 12¾ in., O.D., 50 lb., .375 wall

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IMPORTED CASING AND PIPE
NO PAD TICKETS NEEDED!

4000 TONS — IMMEDIATE SHIPMENT

20" x 65.71 lbs. (.312" thickness) x 24'/26' API Grade 5L—Beveled Ends

Large Tonnages—First and Second Quarter. Shipment J-55 API Oilwell Casing Standard 5½" and 7"

In Stock
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"GIGANTIC WAR SURPLUS EQUIPMENT SALE." Savings to 70%. Engines, A-C generators, welders, winches, small air compressors, water pumps, electric and gas chain saws, binoculars, many other items. Write for wholesale industrial catalog. BURDEN SALES COMPANY, 931-G "O" St., Lincoln, Nebr.

2400 FT. 4½" O.D. Seamless Range #2 Casing, Chase, Kansas. Will sell or trade. Jay Kornfeld, 1121 Union National Bank Building, Wichita, Kansas. Phones 42131-60996.

FOR SALE—Pumping Outfit Complete, nearly new 5 x 10 Gaso Figure 1563 mounted on skids with Waukesha Motor. G&H Supply Co., Box 4052, Oklahoma City, Phone Melrose 27886.

BUCYRUS ERIE 36-L, new 1950, Diesel motor, all tools 3 to 8", new lines, like new $22,500. Oil Producers, Inc., Murray Bldg., Grand Rapids, Michigan.

FOR SALE

186 miles of 8⅝" O.D. x 19.97 lbs. Line Pipe, Single Random Length, Plain Ends beveled for welding and primed, now being taken up in Indiana and Illinois where line was operated under 850 lbs. working pressure. Material available for inspection. For further information please write or call: Commercial Metals Company, P. O. Box 1046, Dallas, Texas, HUnter 4651; Standard Pipe Supply Company, P. O. Box 243, Houston, Texas, CHarter 6976; Texas Pipe Supply Company, P. O. Box 1331, Houston, Texas, BLackstone 0101; Davidson Pipe Company, Inc., 2nd Avenue 50th-51st Streets, Brooklyn 32, New York, GEdney 9-6300.

AIR COMPRESSORS: Davey Model 160 V.D., 160 cu. ft., International Diesel powered; $2,250.00. Chicago Pneumatic, 160 cu. ft., Hercules Gasoline powered; $1250.00. Located Tulsa. Midwestern Drillers, 628 Wright Bldg., Tulsa, Oklahoma. Phone 4-5263.

WELL drilling equipment, new or used. Spudders, rotaries, core & shot hole drills, tools, pipe, bits, blocks, pump jacks, valves. Everything for well drilling and service. Fishing tools rented. Pressey & Son, Pueblo, Colo.

4—125 hp. 300# WP Kewanee Oil Field Type Boilers. 1—85 hp. 125# WP Kewanee Oil Field Type Boiler. These boilers are in excellent condition. Woodford Supply Co., P.O. Box 84, Okla. City, Okla. Phone 3-1454.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 30-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE

2—Vertical Tanks, ¾" plate, 6'6" x 37', with dished ends 1'6", overall length 40'. Bargain.

1—Worthington Pump 10MK Duplex, 2½ x 10, horizontal, silent chain drive, first class operating condition. Bargain.

1—Pennsylvania Air Compressor, 14" cyl., 12" stroke, horizontal, Class 3A, 100 lb., water cooled with aftercooler, unloader and V-belts. $1,000.00.

1—8" Foxboro 3-way Control Valve, unused.

KARL NUSSBAUM AND SONS, INC.
29th & Garland Ave. Louisville 11, Ky.
RAymond 5741 (ask for Walter Nussbaum)

GOOD USED PIPE FOR SALE

1,000' 8" I.D. 28 lb. Good.
2,000' 6¼" beveled end. 40' lengths; 13 lb.; very serviceable.
2,000' 6¼" casing, 13 lb.
15,000' A-1 6" O.D. beveled; 40' lengths; clean; good.
7,500' 6" O.D. plain ends; 40' lengths; clean and useful. Cheap.
4,000' 5⅝" casing, good collars and threads; ready to run.
12,000' 4" O.D. steel pipe; excellent; beveled; clean; 35' lengths.
1,000' Very heavy 3" I.D. casing.
2,000' 2½" plain ended line pipe, heavy and good.
3,000' 2" No. 1 oil well tubing.
5,000' No. 1, 2" tubing; long collars.
1,500' 1½" tubing, clean and good.
2,500' Good ¾".

Also, field gas meters, pressure gauges, gate valves, etc., from 6" down to ¾"; some cable tools. We are selling out our oil and gas business.

THE ALLEN GAS CORPORATION
Paola, Kansas. Phone 317

FOR SALE: 5,000 8⅝" O.D. Used 8-V recessed couplings off of 28.55# pipe that is clean, the dutchmans having been removed with a machine thread in perfect shape. Will sell any part for $1.50 each F.O.B. Shreveport, La. Contact A. A. Gilbert Pipe & Supply Co. P. O. Box 986 or Phone L D 97.

PRESSURE VESSELS
IMMEDIATELY AVAILABLE

13—10' ID dia. x 40' long x 2½" to 3" shell. Heads 3½" to 3". WP 600 and 500 psi.

6—8' ID dia. x 40' x 2" to 2½" shell. Head 2¼". WP 500 psi.

1—6' ID dia. x 40' x 2" shell. Heads 2¼". WP 300 psi. at 900° F.

All used, good condition, seam to seam lengths, code welded construction. Built by A. O. Smith Corp. Located near Chicago, Illinois. Prints, prices available on request.

KINSLOW POWER & EQUIPMENT CO.
817 So. Boulder Phone 5-5914
Tulsa 14, Oklahoma

FOR SALE

5½" OD, 15½ #, J-55, API, T&C, Range-2 300 tons per month January, February and March shipment.

BARON TUBE COMPANY
722 Oliver St., NW.
Atlanta, Georgia

FOR SALE

DOUGLAS DC-3

(Converted C-47)
CUSTOM INTERIOR
PRIVATE COMPARTMENT
Divans — Swivel Chairs

TOTAL HOURS TO AUGUST 20, 1952

Airframe	3038
R/H Engine	415
L/H Engine	280

P&W R-1830-92 Engines—Hamilton Standard 6353A-18 Propellers

RADIO EQUIPMENT: 1 each: 51R-1 Omni-ILS Receiver, 51V-1 Glideslope Receiver, 51R-1 Communications Receiver, 17L-2 Transmitter, RA10DD Range Receiver with Loop, MN5313 Marker Receiver, AVQ-6 Radar Altimeter, 18S-3 Transceiver (Radio Telephone), 2-MN62A ADF's with MN60A Loops.

EQUIPMENT INCLUDES: C-2 Gyrosyn, CO_2 Warning Signal Unit, Cabin Radio & Paging System, A-3 Autopilot, Airstair Door.

BOX E-969
THE OIL AND GAS JOURNAL
Tulsa 1, Oklahoma

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

FOR SALE—One GMR-4 Cooper-Bessemer 300 horsepower, 300 rpm angle type engine equipped with three 8¼" x 14" compressors —maximum discharge 500#. Engine equipped with exhaust mufflers and air filters. Price $10,000 f.o.b. location near Parkersburg, West Virginia. Also, one Clark Bros. Super two cycle 125 horsepower 200 rpm horizontal gas engine with high and low stage compressor cylinders 9" x 20" and 15" x 20" respectively. Price $3,750 f.o.b. present location 20 miles from Charleston, West Virginia. Address inquiry to Columbian Carbon Company, Box 873, Charleston, 23, West Virginia.

OIL Field Casing. New 5½" and 7" German casing from Houston storage. Immediate delivery. P.O. Box 929, Houston, Texas.

FOR sale by owner: A complete Unit-10 power drilling rig with all necessary equipment, in very good condition, for drilling to a depth of 6,500 ft. $45,000.00 net F.O.B. Wood County, Texas. Contact Tommy Miers, Ph. 53431, or P.O. Box 3174, Shreveport, La.

LIQUIDATING
REFINERY & GASOLINE
PLANT EQUIPMENT

Located Tulsa, Oklahoma, area — Used, condition good. All Welded—API ASME Code construction

SHELL & TUBE HEAT EXCHANGERS AND COOLERS.

1—Devine Cooler, 405 sq. ft. surface; shell 150#, tubes 400# 1¼" OD Steel.
2—Devine Bottoms Coolers, 950 sq. ft. surface each; shell 250#, tubes 150# 1" OD Admiralty.
1—Griscom-Russell Condenser, 200 sq. ft. surface; shell & tubes 150#; tubes Admiralty.
2—Griscom-Russell Coolers, 100 sq. ft. each surface; G-Fin sections; shell & tubes 75#, tubes Admiralty.
3—Devine Coolers, 1000 sq. ft. surface each; shell & tubes 100#, tubes 1" OD Steel.
2—Coy Coolers, 134 sq. ft. surface each; shell 175#, tubes 150# 1" OD Steel.
1—Devine U-Tube Preheater, 350 sq. ft. surface; shell 325#, tubes 140# 1" OD Admir.
1—Devine Cooler, 185 sq. ft. surface; shell 300#, tubes 350# 1¼" OD Steel.
1—Griscom-Russell Reboiler, 500 sq. ft. surface; shell 150#, tubes 150# ¾" OD Timken.

TOWERS & PROCESS VESSELS.

1—Devine Evaporator 9' dia. x 40' x ⅜" shell & ¾" heads; has 14 trays. 50 psi. WP.
1—Southwestern Eng. Depentanizer Fractionator, 7' dia. x 65' 2" x ⅜" shell; has 24 bubble cap trays. 50 psi. test.
1—Devine Stripper, 4' dia. x 15' x ⅜" & ½" heads. Has four bubble cap trays and 10' skirt; overall length 25'. 50 psi. WP.
1—Badger Stripper 4' 6" dia. x 15' 7½" including 18" skirt. Has 6 trays bubble type. Shell & heads ½". 80 psi. WP.
2—Drip Tanks 1' 7¼" dia. x 4' x ¼" shell.
1—Butane Frac. Column 3' 6" dia. x 23' x 5/16" shell & ½" heads. 100# WP.
1—Receiver tank 3' 6" dia. x 8' x 5/16" shell and ½" heads. 100 psi. WP.
1—Octane Column 1' 11¼" dia. x 29' 10" x ⅜". 100 psi. WP.
1—Receiver, 1' 11¼" dia. x 7' 6" x ⅜". 100#.
1—Devine Treater, 2' dia. x 17' 1½" x ⅝" shell and heads; 350 psi. WP.
1—Columbian Clay Tower 8' dia. x 27' x ⅜" shell & ⅝" heads; 50 psi. WP.
1—Flue Surge Tower 3' dia. x 29' 4" x 7/16" shell & heads; 100 psi. WP.

KINSLOW POWER & EQUIPMENT CO.
817 So. Boulder, Strode Bldg.
Phone—5-5914
Tulsa 14, Oklahoma

FOR SALE or trade: 4500 ft. 8⅝" O.D., 32 lb. seamless, 8V thread casing. Phone 5-3545 or write Box 1581, Tulsa, Oklahoma.

FOR SALE: 1 Mack 1948 Model LJ 7-ton truck complete with Tulsa Model 84 winch, and Oilfield Ginpole Bed. Equipped with AJ 11 X 22 rubber. F.O.B. Wichita Falls, Texas. $4500.00. Phone 2-5401 or write Jack Grace Drilling Company, Wichita Falls, Texas.

ONE Superior Twin Ninety Horse two cycle direct connected compressor with high and low cylinders with intercooler ready to run. Telephone 1060, Box 546, Bartlesville, Okla.

FOR SALE: New 5,000 Bbl. Cap. API 10 Gauge Bolted Steel Tank. Ready to Ship. Attractive Price. Lestan Corp., Rosemont, Penna.

FOR SALE: One 36-L Bucyrus-Erie drilling machine, complete with tools. Also 1,943 ft., new 7 inch, 17 lb., H-40, range 2, seamless casing and 2,400 ft. of new 2⅜ inch, 4.60 lb., range 2, J-55, seamless regular tubing. Box E-812, The Oil and Gas Journal, Tulsa, Oklahoma.

COMPLETE Cardwell rotary rig; 6 x 16 pump; 87' Lee C. Moore mast; 3,000' 4½" drill pipe. Price $30,000. Ready to drill. Box G-100, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Vernon-Corwin Desander for rotary mud. Complete with pump. Thoroughly reconditioned and painted. $895.00. Box G-116, The Oil and Gas Journal, Tulsa, Oklahoma.

1 Oilwell Steam Pump, 16½ x 7¾ x 20" 1 Gardner-Denver Steam Pump, 18 x 8 x 20". Both pumps are in excellent condition, may be seen at Makin Drilling Company Yard, Hobbs, New Mexico. MAKIN DRILLING COMPANY, Box 1628, Hobbs, New Mexico.

5000' of 4½" API Full Hole Drill Pipe. 3,500' of 3½" Bottleneck Drill Pipe. 3,600' of 3½" Internal Flush External Upset Drill Pipe. All above pipe is Sonoscoped 70%. #2 30% #3. Also 4600' 4" OD 14# R2 Smls. Drill Pipe w/5¼" OD Tool Joints. Milford Giffin, Tel. 477, Hoisington, Kansas.

FOR SALE: Buda Engine Model PCS-1679, Butane equipped, skid mounted with 20" 12 groove D section pulley with 12 330 D section belts. This engine was purchased in October 1949 and has been in use approximately 8 months. Price $4,500.00. Beard Drilling Co., P. O. Box 70, Duncan, Okla.

DUE to discontinuing producing operations we have for sale approx. 25 Reda Pumps from 7½ to 60 H. P. adaptable to 6⅝ I. D. and larger casing. Can be purchased for 50% of initial cost. All factory reconditioned. Dupo Oil Refining Co., Box 2, Lemay, Missouri.

FOR SALE: Water well deep core rig. Joy 37 Special, 1500 ft. Drum pulled by Buda H. P. 326. 4½X6 D. C. Pump. 38 ft. Derrick, mounted on K 7 International 1948. 800 ft. 2⅜-20 ft. drill pipe and all necessary equipment in first-class condition. Contact J. A. Finlayson, 108 E. 4th., Tyler, Texas. Ph. 3-3563.

FOR SALE: 600 feet drill pipe 2⅞" O.D. x 20 feet 3⅜ O.D. Tool Joints—2⅜ IF Thread—A-1 Condition—$2.50 per foot. Circle Drilling Company, 220 Mayo Bldg., Telephone 2-9489, Tulsa, Oklahoma.

FOR SALE: 1—Bucyrus-Erie 28L Spudder No. 45408, with 36L Mast and Tools, stems for 13", 8" and 6" with fishing tools. All small tools and drilling lines. Dog house on rubber Tire Wagon. Everything complete and now drilling. Price $14,000.00. Approximately 280' of 10", 880' of 8" and 1500' of 6⅝" casing. Price $3,000.00 1—Model TD-4 International Dozer, 50" Tread, 14" shoes, Electric Lights and Starter, Bucyrus-Erie Hydraulic angle Blade, with Model "E" Carco Single Drum Winch. Used very little, good condition. Price $5,500.00. Call or write Harry J. Iles, Phone 254, St. Clairsville, Ohio.

FOR SALE: Fort Worth Spudder mounted on tandem with new UD9 International motor and complete equipment for shallow drilling including GMC 48 model 3-ton truck with float, GMC 39 model 1¾-ton truck, GMC 49 model ¾-ton pickup, Wilson 200 amp. portable welding machine, complete utility unit, 4,300 ft. ¾-in. drill line, 800 ft. 8-in. pipe. Chas. C. Reid, 1720 Keeler [illegible] Wichita Falls, Texas, phone 6495 or 8001.

EQUIPMENT FOR SALE

FOR SALE: 24L Bucyrus Spudder. Late model on rubber, with top to bottom tools, 6, 8, and 10". 1800' drilling and sand lines, dog house, light plant and etc. Also 1000'—7" pipe. Donald Davis, Poneta, Indiana. Phone 972-2, Bluffton, Indiana.

FOR SALE: R. L. Cardwell with HXE Hercules Engine, 1st class condition, $6,500.00. Fred Cooper E 563 Winch Tractor, Single Drum mounted on six 75-inch Tires, 50 ft. mast, fine condition service 5,500 feet of 2⅛ inch upset tubing. Box 1215, Tulsa, Phone 5-8850.

ONE Emsco-500 equipped with 1-year old 2505 Buda Diesel Engines, Lee C. Moore triple jackknife mast with substructure, Shaffer blowout preventer, steel mud tanks, Kelco power slips, 8,000 ft. 4½-in. drill pipe with Reed Shrink Grip tool joints. Rig is complete, in good condition, ready to run. Box G-125, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Model R4 Wichtex draw works, 65' mast. Powered with PA 100 International motor, V-belt rotary drive, 17" oil bath, oil well rotary table, HB 50 Brewster block and hook, ⅞" drilling line, and guy lines, factory built steel sub-structure, folding walks and steps, 36' grooved kelly and kelly bushings, Wilson tongs, and 3½" mission slips. $10,000. GMC 2½ ton tandem truck, new tires and motor, oilfield bed and winch. $1800.00. 3000' 3½" modified drill pipe $1.25 per ft Used 100 bbl. welded tank $125.00. F H. GRAVES DRILLING CO., Box 583, Ardmore, Oklahoma. Phone 4726.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal

EQUIPMENT FOR LEASE

HEAVY wing Boranza for lease. Complete instrument panel, IMNI, VHF, cabin air conditioner, constant speed prop. Contact us for lease arrangements for aerial transportation. Ritchey Flying Service, Meacham Field, Fort Worth, Texas. Phone MA-2158.

TWIN Beach Executive D18S for lease to responsible companies. Complete instrument panel—ILS and OMNI—three chairs, 3-passenger couch. Auxiliary 80 gal. nose tank, 2 NTSO P&W engines, hydraulic props. Just re-licensed—ready to go. Ritchey Flying Service, Meacham Field, Fort Worth, Texas, Phone MA-2158.

EQUIPMENT WANTED

WE BUY well drilling equipment machines, cable tools, pipe, etc. Turn your surplus equipment into cash. Pressey & Son, Pueblo, Colorado.

WANTED: Three engine compound for Wilson Titan drawworks. Makin Drilling Company, Box 1628, Phone 3-3141, Hobbs, New Mexico

WANTED: 1—Boiler approx. 25,000 # Steam per hour 200 # WP. 1—Vacuum Jug approx. 8' dia. with trays. 1—Crude Oil Fractionator 8' dia. with 20 to 25 trays. Send price and full particulars to Northwestern Refining Co., St. Paul Park, Minnesota.

WILL PAY highest prices for used casing used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma

WANTED: Weber and Fairbanks-Morse engines, 25 and 40 H.P. R. E. French, Gridley, Kans.

WANTED: Laboratory equipment, gum testing apparatus, air jet and ind period. Send full particulars to Northwestern Refining Co., St. Paul Park, Minnesota.

HELP WANTED

WANTED: Experienced seismic party chiefs, observers and computors for service in Central and South American countries. Must be prepared to fulfill two year contracts at appropriate salary. Assignments starting not later than December 1952. Write giving details of experience and education. Letters will be held confidential. Box E-928, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

WANTED: Graduate Petroleum Engineer, one or two years reservoir experience, to work for independent on secondary recovery programs. Give details of experience and salary expected in first letter. Box E-999, The Oil and Gas Journal, Tulsa, Oklahoma

PETROLEUM GEOLOGIST wanted in West Texas by independent oil company. Desire one to three years of practical experience in sample work and subsurface mapping. Reply should give experience, education, age, marital status and starting salary required. Box E-959, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER wanted by independent oil company in West Texas. Require two to four years working experience in drilling and production. Reply in detail stating education, experience, age, marital status and starting salary desired. Box E-958, The Oil and Gas Journal, Tulsa, Okla.

CHEMICAL ENGINEER for design and/or field installation of gas process equip. At least 2 years exp. in plant process or construction. Leading S. W. Manufacturer. Box E-992, The Oil and Gas Journal, Tulsa, Oklahoma

HELP WANTED

SALES Representative to sell proven paint, solvents, and chemical products already in major supply stores. Have no objection to representative handling non-competitive products. Liberal commission basis. Requires some knowledge of chemical engineering. Box E-968, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL Industry Employment Service, 408 Tuloma Bldg., Tulsa, Okla. 4-5974. Tom Robinson, owner. For Technical and Trained Personnel, including LPG.

CAT CRACKING OPERATORS Wanted: Men with experience in Thermal or Cat Cracking for positions of operator and assistants with Midwest refinery now installing new Cat Cracking Unit. Box E-980, The Oil and Gas Journal, Tulsa, Oklahoma.

ASSISTANT Controller — Integrated oil Company in Mid-Continent area is seeking an experienced Assistant Controller. Position requires top-level man with experience in oil, systems and costs. Please submit resume which must give complete data on experience, salary requirements, and personal history, including education, background and associations. Box E-965, The Oil and Gas Journal, Tulsa, Oklahoma

• • RESERVOIR • • ENGINEER

Major Oil Company in Venezuela has opening for Graduate Petroleum Engineer or Geologist for work in Production Laboratory. One year's experience with PVT equipment desirable.

WRITE GIVING FULL DETAILS TO:

P. O. BOX NO. 35

Bowling Green Station, New York 4, New York

OVERSEAS OPPORTUNITIES

Affiliates of
STANDARD OIL COMPANY (NEW JERSEY)
located in South America

NEED ....

EQUIPMENT INSPECTORS:

Engineering degree and several years metals inspection experience required. Will inspect refinery process equipment and request renewals where corrosion, failure, or defectiveness under safety codes makes necessary.

MECHANICAL ENGINEERS:

Qualified engineers needed experienced in: design of refinery and related equipment including utilities, materials listing and specification, and/or refinery maintenance engineering.

These are regular staff positions offering liberal salaries and benefit plans.

WRITE

giving complete address, age, marital status, education and details of previous experience.

Box 308-K, Radio City Station, New York 19, New York

HELP WANTED

SEISMIC PERSONNEL needed for United States and Canada by well known and expanding contract geophysical company. Address Box E-963, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: SEISMIC SUPERVISOR. Must have Party Chief experience, age 30 to 38, degree Geology or Geophysics. Replies will be kept strictly confidential. Call or write giving complete experience. A. E. "Sandy" McKay, Continental Geophysical Co., 602 Continental Life Building, office phone Fannin 9231, Residence phone Sunset 6053, Fort Worth, Texas.

HELP WANTED

LANDMAN: Should have at least 10 years' experience, not over 45 and familiar with varied areas in Texas. Will head new Land Department and primary duties will be to originate and work up new drilling deals, both wildcat and in proven areas. Must be willing to be away from home as much as necessary. Will pay good salary, but no participation other than an opportunity to purchase royalties. Will be based in Fort Worth. HILL & HILL, 1325 Fort Worth National Bank Building, Fort Worth 2, Texas.

MECHANICAL engineer with eight years' experience in the construction and maintenance of refinery equipment to assume duties of mechanical superintendent in new modern refinery. Must have experience on fluid catalytic crackers and experience in metal inspection desirable. Box G-112, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST or petroleum engineer interested in joining in formation of stock company for purpose of drilling and exploration. No investment required—only experience. Larry Collins, 1340 Ivy St., Denver, Colorado.

REFINERY operators with sufficient experience in crude distillation, fluid catalytic cracking, gas polymerization and treating and qualified to assume shift foreman positions in new modern refinery. Box G-114, The Oil and Gas Journal, Tulsa, Oklahoma.

INSTRUMENT man with sufficient refinery experience to install and maintain instruments and head instrument department in modern refinery now under construction. Should have experience in catalytic cracking instrumentation. Box G-121, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Graduate electrical, civil or mechanical engineer for office and field work by major oil company in Middle West. Please state age, experience and educational qualifications. Box G-105, The Oil and Gas Journal, Tulsa, Oklahoma.

AT ONCE

WE HAVE OPENINGS FOR 3 FACTORY REPRESENTATIVES to cover definite territories. Applicant must drive his own car and must have contracts in the Oil, Gas, and Chemical Industry. Territories must be covered every sixty days. We are the largest manufacturer of Compressor Valve Discs and Compressor Springs in the country. Are enjoying a substantial increase in business and are opening territories which have not been covered regularly in the past. If you want to earn ten thousand per year or more, write

TRI-STATE MFG. & ENG. CO.
2041 E. 46th Street
Indianapolis, Indiana.

HELP WANTED

GRADUATE Chemist with three years' experience in refinery laboratory to set up and be in charge of laboratory in new modern refinery. Box G-113, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Sales Engineers for large industrial instrument manufacturer. Prefer men with process experience in chemical and oil industries. Prefer Mechanical and Chemical Engineers. Fine opportunity for young engineers with sales aptitude to connect with one of the fastest growing industrial instrument companies in the United States. Must be graduate engineers or equivalent. Exceptional opportunities. Box G-101, The Oil and Gas Journal, Tulsa, Oklahoma.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column? Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

SITUATIONS WANTED

OLDER Petroleum Engineer (Degree) wants job. Familiar with drilling, completions, production. Acidizing expert. Box E-967, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED land and contact man. Desires connection with oil company or drilling company seeking production. Box E-986, The Oil and Gas Journal, Tulsa, Oklahoma.

OUTSTANDING cutting oil, rust preventive and grease chemist desires position of Chemical Director with progressive company. Thirty million dollars worth of products formulated in past ten years. Fifteen years Chemical Director and Top Contact man. Box E-995, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING and Production Superintendent, 20 years Administrative and Operational Experience covering all phases of drilling and production of Oil and Gas wells in the Gulf Coast, South Texas and Ark-La-Tex Areas. Capable, Conscientious Worker, Married, 41 years of age, Character and Ability References Available, Presently Employed. Box E-998, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1628. Ph. No. 3-3141, Hobbs, New Mexico.

MECHANICAL Draftsman, B.S. in Industrial Arts. Age 25, married veteran, father, two years engineering experience designing special equipment. Presently employed by an aircraft company. Desire permanent position with progressive oil company or equipment manufacturer. Box G-108, The Oil and Gas Journal, Tulsa, Oklahoma.

LAWYER—32, married, 5 years general practice, considerable oil and gas work, desires connection as lawyer-landman with independent or oil company in Dallas-Fort Worth area. Box G-107, The Oil and Gas Journal, Tulsa, Oklahoma.

SUBSURFACE geologist, four years experience in Texas, desires change. Prefer Kansas or Oklahoma. Box G-106, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER: 10 years' experience in drilling and production, excellent references. Box G-111, The Oil and Gas Journal, Tulsa, Oklahoma.

SUBSURFACE Geologist desires position with large independent oil company in Oklahoma or Colorado. Three years experience with major oil company. Some sample running and well sitting experience. Box G-122, The Oil and Gas Journal, Tulsa, Okla.

GRADUATE Petroleum Engineer, 12 years experience in drilling, production, reservoir, and secondary recovery work desires connection with small company. Box G-123, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM GEOLOGIST, age 31, graduate of L. S. U., with 3 years experience (mostly in Gulf Coast) desires position with progressive oil company preferably in Houston. Box E-983, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

LANDMAN: Law degree, ten years' oil and gas experience with major companies, including secretarial, clerical, abstracting, lease records, title curative. Married, exempt military service. Desire position with solid independent. Box G-117, The Oil and Gas Journal, Tulsa, Oklahoma.

CONSULTING ENGINEER. Available for fee or retainer representation in Rocky Mountains, Permian Basin, and Kansas. Evaluations and Supervision of Royalty or Operating Interests. Geological Reports and Deal Negotiations. References. Box E-968, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST 12 years major company diversified experience geology, scouting, leasing. Available. Will go anywhere. Box E-973, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer desires to supervise drilling, completions and production for independents in West Central Texas on retainer basis. Box E-946, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Geologist with Ph. D. interested in Domestic Oil Company assignment. Box E-991, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, recent graduate of Kansas State College; no experience. Prefer smaller company. Location no factor. Bob Bowersock, Box 185, Sedan, Kansas.

PRODUCTION Engineer; Five years experience in developing, producing, and evaluating oil properties with both a major and independent producer. Desire responsible position with progressive operator on salary and/or interest. Box G-103, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Rotary, Cable Tool and Production man would like to manage Oil Operators Drilling interest in Kansas. Can furnish reference. Oscar R. Gaultney, 2230 E. 20th. Phone 4-8532, Wichita 14, Kansas.

PETROLEUM ENGINEER: Seven years drilling, producing and workover experience. Presently employed by major company. Desires responsible position with smaller company. Box E-982, The Oil and Gas Journal, Tulsa, Oklahoma.

CONSTRUCTION Engineer. Experienced refinery and oil handling construction, age 36, desires contacts leading to foreign contract. Now completing term in Middle East. ETA United States, 3 months. Box G-118, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—position in progressive refinery. I am 24 years old and married, recently discharge from Marine Corps. I have 7½ years experience as laboratory tester, topper operator, boiler fireman, vacuum still operator, and emulsion man. Box. G-126, The Oil and Gas Journal, Tulsa, Oklahoma.

DESIRE Sales Representative Position in Oil Industry, preferably in North Texas or Oklahoma, but will consider any location. 29 years old, married, and two children, 7 years varied experience with major oil companies in production, pipe line, oil well servicing, and service engineering. Box G-120, The Oil and Gas Journal, Tulsa, Okla.

PRODUCTION SUPERINTENDENT - PETROLEUM ENGINEER. Oklahoma University 11 years responsible operational and administrative experience. 5 years sales and management technical services and tools, 4 years assistant general superintendent drilling and producing, 2 years general production manager Kansas and Rocky Mountains. Experienced leases, deal negotiations, geological and engineering evaluations, drilling and producing operations, sales and management. Will carry load and earn way with established, active organization operating Mid-Continent or Rocky Mountains. Age 38. Details without obligation. Box G-115, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

1246-ACRE drilling block western Runnels County, Texas. New 5 to 10 year leases. $20.00 per acre and 1/16 overide. Write 602 McBurnett Bldg., San Angelo, Texas.

POTENTIAL Gas Lands for lease; several producing wells in territory; three gas lines through territory making ready market. For information, write Critchett & Woods Lumber Co., Inc., Ollie, Louisiana.

LEASE AND DRILLING BLOCKS

160 ACRES, Jack County, Texas. Offset acreage held by three major companies. Major company acreage taken after seismograph. Consideration: Ellenburger test plus small override. Possibility major company dry hole contributions. Paul Fleming. 1502 Fillmore. Wichita Falls, Texas.

FOR SALE: 8000 acres State and Federal leases in D- Baca County, New Mexico. Box G-110, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 1/16 working interest in 360 acres of a proven oil field in Nebraska. One well is pumping 70 barrels from Hunton and one produces ten barrels from Viola. A new cement job is necessary to bring this well up to the offset of 70 barrels per day. There are other drillings on this acreage and it is 90% sure of getting a well. I will sell my 1/16 holding for $5000.00; or my group would be interested in an offer for the complete acreage. My reason for selling is need of cash. Box G-119, The Oil and Gas Journal, Tulsa, Oklahoma.

LITTLE man's chance. Redrill 80 acres, originally had 4 oil wells. 1/32 interest $100, into tanks if a commercial producer. Producing offset well now. Send cashier's check or money order, will cash when sand is drilled. L. Price, Coweta, Oklahoma.

FOR SALE: New 69-acre lease, directly between two drilling wells, surrounded by major company holdings, in Shelby County, heart of East Texas oil and gas activity. Write C. A. Parker, 136 Austin St., Center, Texas.

FOR LEASE: The owners of the land and/or the mineral rights on 75,000 acres in Northeastern Louisiana would like to secure proposals for exploration and development on large or small acreages. One producer on the tract. Box E-864, The Oil and Gas Journal, Tulsa, Oklahoma.

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WANTED: Well qualified oil operator, regularly engaged in the oil and gas business to take over and develop offset acreage to good oil production in South Central Oklahoma. At least two sands to Approximately 2500 feet. Also 160 acre semi-proven lease at deeper depth. Address J. S. Graham, owner, Chickasha, Oklahoma. Telephone 2332.

FOR SALE: Propane and butane business. Over one million gallon volume. Two bulk plants. Three tank trucks. Four retail outlets. Long term gas contract. Incorporated. Will sell capital stock or assets. Contact Elmer Jarvis at Wheaton, Missouri.

FINANCIAL and experienced help wanted with equipment to develop. Three central Illinois shallow potential oil pools. R. B. Claypool, Lock Box 36, Williamsville, Illinois, Telephone 6.

REWARD OFFERED

STOLEN!!! New christmas tree valve from Central Pennsylvania. 10,000# test. Serial No. 51-52-10-1044. Manufactured by Oil Center Tool Company. $500.00 reward information. Box G-124, The Oil and Gas Journal, Tulsa, Oklahoma.

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1 concrete block office building 1,400 square feet.

Storage docks and pipe racks on 5-acre lot 625' x 355' enclosed with 6' Cyclone Fence. Ideal location for independent oil operator trucking firm. Industrial Concern Warehouse.

Address: H. F. FISHER
P.O. Box D-15 St. Louis, Missouri

TRADE

TRADE: Model NJU, 6-ton, 4-wheel drive, MACK TRUCK, with 532 cu. in. engine and 15,600 lb. pull front winch—cost over $7000.00—unit driven only 18,000 miles. Will trade for late model 7½ X 10 or 7½ X 12 mud pump. R. F. HARE, 2018 W. T. Waggoner Bldg., Fort Worth 2, Texas.

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PRODUCTION WANTED

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Also interested in drilling proposals with geological merit. We are not interested in Conversation, we want to buy or drill. Please submit your proposals and they will be given courteous, prompt and business-like attention. All inquiries will be held in strictest confidence.

BOX G-109, THE OIL AND GAS JOURNAL, TULSA, OKLAHOMA

EQUIPMENT MEN

(Continued from page 197)

dent of the company, requirements of new plant and additional specialized personnel necessitated larger offices.

W. Joe Stafford, for many years associated with the oil industry and formerly with Hydril, has recently joined the Atlas staff as sales engineer.

Montgomery Returns to Halliburton From PAD

MONTGOMERY

After a year with the Petroleum Administration for Defense in Washington, D. C., Phil Montgomery has returned to Halliburton Oil Well Cementing Co., Duncan, Okla.

Manager of Halliburton's mechanical research and development department before his PAD service, Montgomery has been named to a new position as technical coordinator for cementing services.

Montgomery is attached to the staff of William D. Owsley, Halliburton vice president for engineering advice to management.

An engineering graduate of University of Oklahoma, Montgomery has been with Halliburton for 20 years, the first 10 as a field engineer and the second 10 in supervisory engineering posts at the company's Duncan headquarters.

Brown & Root Elects Towne Vice President

Election of I. N. Towne as a new vice president of Brown & Root, Inc. has been announced by Herman Brown, president of the engineering and construction firm.

Towne has been recalled from the island of Guam where for the past 6 years he has been project manager of a large construction contract employing over 7,500 men. This contract was with Brown-Pacific-Maxon, a joint-venture group composed of Brown & Root, Inc., Pacific Bridge Co., and Maxon Construction Co., Inc.

In his new position with Brown & Root, Towne will operate out of Houston.

American Mfg. Co. of Texas Names Three Promotions

R. S. HESTAND

New officials of American Manufacturing Co. of Texas was announced recently by W. J. Gourley, president. They are Floyd Hubert, secretary-treasurer to the post of general manager; J. E. Lott, plant superintendent to vice president in charge of operations, and Rue S. Hestand, chief engineer to vice president in charge of engineering.

Hubert joined the company in 1942 as a member of the accounting depart-

FLOYD HUBERT

J. E. LOTT

ment, and for the past several years has served as secretary-treasurer. Lott came with the firm in 1934 as an apprentice machinist and has served in various plant and supervisory capacities, including that of plant superintendent since 1944. Hestand joined American in 1942 as a design engineer in the general engineering department and since that time has served as assistant chief engineer and chief engineer prior to his promotion.

American Manufacturing Co. of Texas was established in Weatherford, Tex., in 1924 by W. J. Gourley as Weatherford Foundry & Machine Co.

Frank W. Murphy Makes Office, Personnel Changes

Recent changes in office and personnel have been announced by Frank W. Murphy, manufacturer of engine and pump controls.

G. B. Schapaugh has been transferred from the manufacturing department to the position of sales engineer covering original equipment manufacturer accounts. Schapaugh was associated with Fruehauf Trailer Co. for several years before joining Frank W. Murphy.

The company also announces the opening of a new office in Los Angeles to cover the West Coast territory. This office will be in charge of W. W. Grigg.

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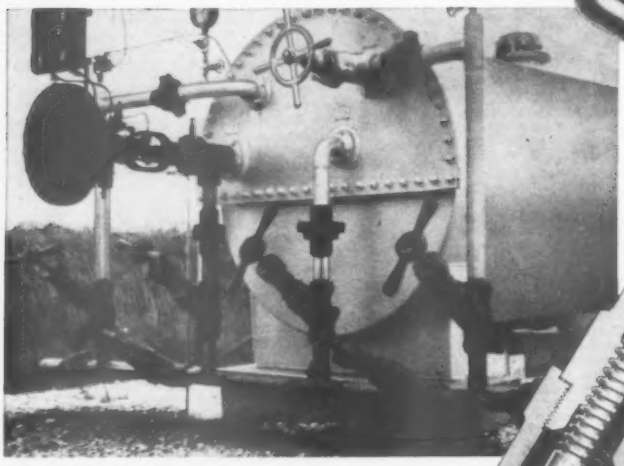
LEGAL

4,808.37 acres of Tribal Indian lands located on the Uintah and Ouray Indian Reservation, Township 1 North, Range 2 East, Uintah Special Base Meridian Survey, in Uintah County, State of Utah, are being advertised for oil and gas lease sale, bids on which will be opened 2:00 P.M., October 28, 1952 at the office of Harry W. Gilmore, Superintendent, Uintah and Ouray Agency, Fort Duchesne, Utah. Full particulars may be obtained from the office of the Regional Oil and Gas Supervisor, U. S. Geological Survey, Casper, Wyoming, or from the Uintah and Ouray Agency.

For Punishing Pressures

Edward 6000 lb W. P. FORGED STEEL VALVES



Rugged 2" figure 158 valves in outdoor application in natural gas industry. Impactor handle, furnished with 2" size, gives 2.8 times closing force of ordinary handles.

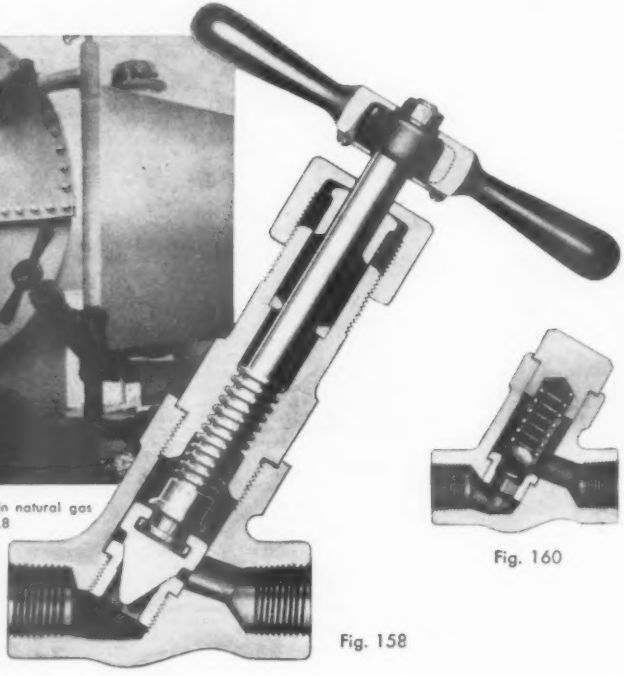


Fig. 158

Fig. 160

Rated for 7500 lbs at 125F in the 2" size and for 6000 lbs at 125F in the ¼" to 1½" sizes, Edward drop forged steel Fig. 158 stop valves have been developed for excessive pressure systems operating under 300F. Thosè design details insure certain shut off, reduce replacement costs and maintenance time:

- ✓ Drop forged steel bodies specially heat treated.
- ✓ Stem at 60 degree angle to reduce wear producing turbulence, lower pressure drop.
- ✓ Seat, disk, and stem of EValloy 13% chromium stainless steel.
- ✓ Renewable screwed in seat with long threads below pressure joint for leak proof seating.
- ✓ Inside screw construction, deep stuffing box and special gland and packing nut design to lengthen packing life.
- ✓ Bonnets EValized by exclusive plating process for maximum corrosion and abrasion resistance.
- ✓ Body contours streamlined for free flow with low pressure drop.
- ✓ Stem of EValloy stainless steel, centerless ground to fine finish, long wearing Acme form threads, backseating shoulder.

Furnished in globe and angle designs with screwed or socket welding ends in sizes from ¼" to 2". Also available as ball check valves, Fig. 160, in same ratings and sizes. Ball check valves have identical body and seat, rolled steel bonnets, stainless steel ball accurately ground for tight seating, and stainless steel spring to aid in seating ball in more viscous fluids.

For complete catalog of forged and cast steel valves write Dept. OG, Edward Valves Inc. 1492 West 145th St. East Chicago, Indiana

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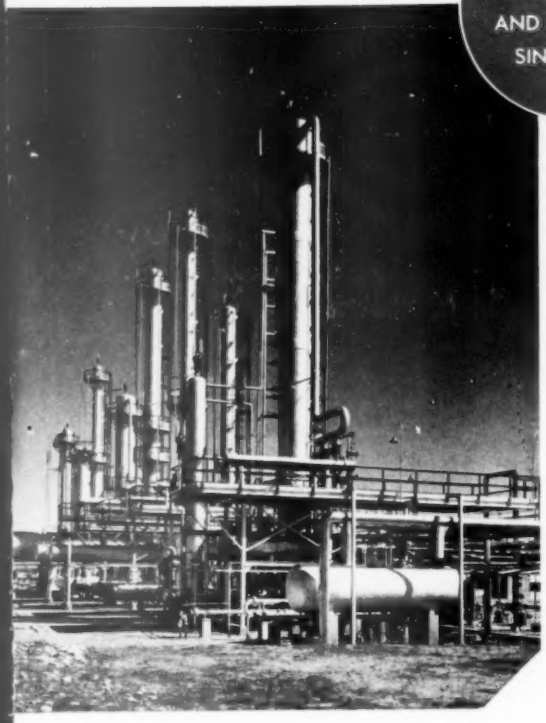

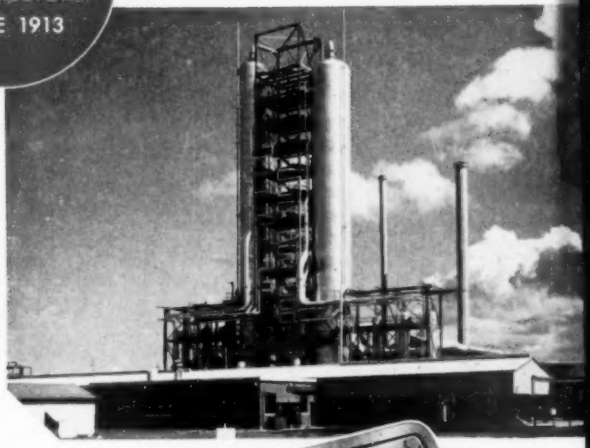

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